INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal, Hyderabad - 500 043

COMPUTER SCIENCE AND ENGINEERING(AIML)
QUESTION BANK

Course Title	**ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING**				
Course Code	AEED01				
Program	B.Tech				
Semester	I	CSE(AIML)/AERO/ME/CE/IT			
Course Type	Foundation				
Regulation	BT-23				
Course Structure	Theory			Practical	
	Lecture	Tutorials	Credits	Laboratory	Credits
	3	-	3	-	-
Course Coordinator	Ms. M.Varalakshmii, Assistant Professor,EEE				

COURSE OBJECTIVES:
The students will try to learn:

I	The fundamentals and analysis of electrical circuits with DC and AC excitations.
II	The construction and operating principles of Electrical machines.
III	The operational characteristics of semiconductor devices with their applications.

COURSE OUTCOMES:
After successful completion of the course, students should be able to:

CO 1	**Make use of basic electrical laws for analysis of DC and AC circuits.**	Apply
CO 2	**Solve the network theorems to calculate the parameters in electrical circuits.**	Remember
CO 3	**Demonstrate the fundamentals of electromagnetism for the operation of DC and AC machines.**	Apply
CO 4	**Utilize the characteristics of diodes for the construction of rectifiers and regulators circuits.**	Understand
CO 5	**Interpret the transistor configurations for optimization of the operating point.**	Understand
CO 6	**Illustrate the amplifier circuits using transistors for computing hybrid parameters.**	Understand

QUESTION BANK:

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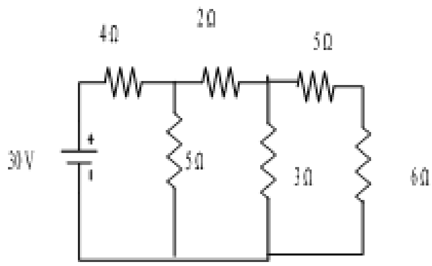
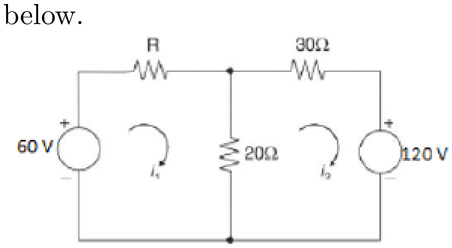
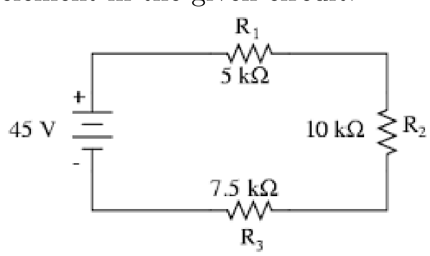
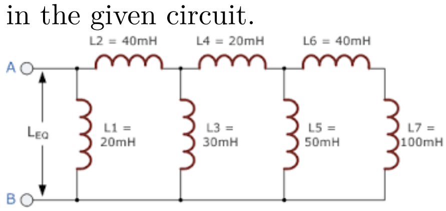
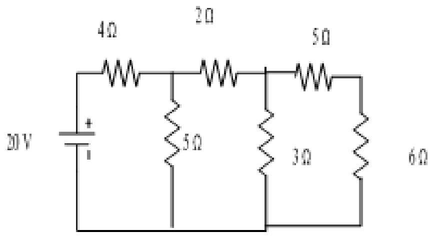
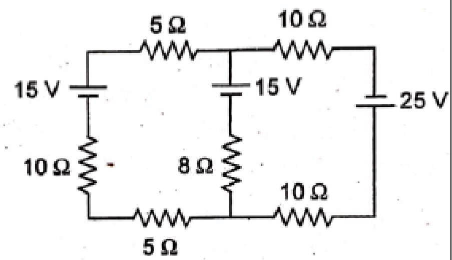
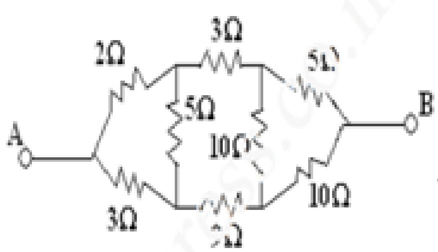
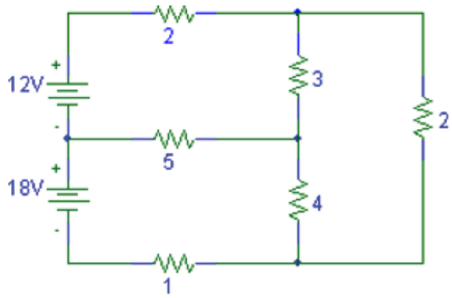
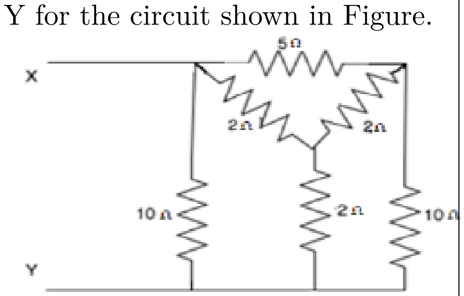
	MODULE I			
	INTRODUCTION TO ELECTRICAL CIRCUITS			
	PART A-PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS			
1	Deetrmine equivalent resistance and source current 	Apply	The learner to recall reduction technique and understand Ohm's law and apply them to calculate the Source current.	CO1
2	Find the value of R if i1= 0.24 A for the circuit shown in Figure below. 	Apply	The learner to recall reduction technique and understand current division and apply them to calculate the current response in each element.	CO1
3	Determine power across each element in the given circuit. 	Apply	The learner to recall V, I and P relations, understand the KVL,KCL and apply them required to compute the powers..	CO1
4	Determine equivalent inductance in the given circuit. 	Apply	The learner to recall series and parallel circuits and understand the equivalent inductance of given circuit to calculate it.	CO1

5	Apply mesh analysis and calculate the current above through each element. 	Apply	The learner to recall mesh analysis concept and understand writing equations using KVL and apply for the given circuit ti find each element current.	CO1
6	Find the current in the 8 ohm resistor in the following circuit shown in Figure using Kirchoff's laws. 	Apply	The learner to recall nodal analysis method and understand writng nodal equations by using KCL and apply the results to calculate the power observe of each element	CO1
7	Determine the voltage to be applied across AB in order to drive a current of 5A In the circuit by using star-delta transformation. 	Apply	The learner to recall star to delta configuration and understand about star to delta transformation to find the equivalent resistance and calculate the voltage.	CO1

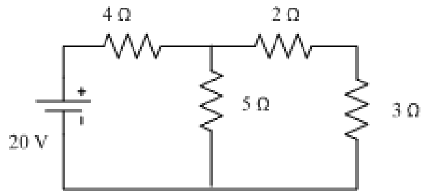
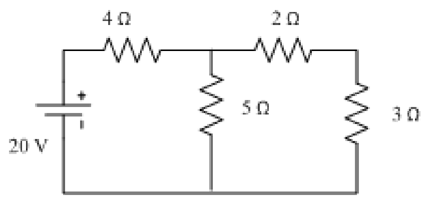
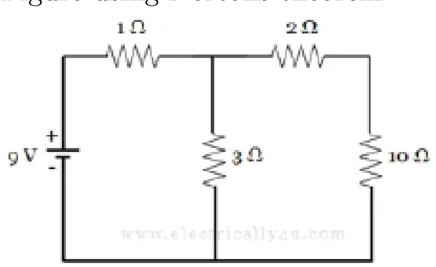
8	Calculate the three mesh currents for the circuit shown in Figure using mesh current analysis technique.All resistances are in ohms. 	Understand	The learner to recall star to delta configuration and understand about star to delta transformation to reduce the network and calculate the current.	CO1
9	A sine wave has a frequency of 50KHZ.How many cycles does it complete in 20ms?	Understand	The learner to recall the geometric waveform that oscillates and understand moves up, down or side-to-side periodically.	CO
10	A sine wave has a peak value of 25V.State the following values a) rms b)peak to peak c)average	Remember	–	CO2
11	The period of a sine wave is 20 milliseconds. State the frequency value.	Remember	–	CO2
12	The frequency of a sine wave is 30HZ . what is the period .	Remember	–	CO2
13	Determine the value of the equivalent resistance across X and Y for the circuit shown in Figure. 	Remember	–	CO2
14	A sinusoidal voltage applied to a capacitor 0.01 microFarads, the frequency of sine wave is 2 KHz. Determine the capacitive reactance.	Remember	–	CO2

15	A sinusoidal voltage applied to a inductor 2mH.the frequency of sine wave is 3 KHz. Determine the inductive reactance.	Remember	–	CO2
PART-B LONG ANSWER QUESTIONS				
1	Is it possible to connect directly two current sources 5A and 3A in series? And similarly can we connect directly two voltage sources 2V and 6V in parallel? Justify your answer.	Understand	The learner to recall Kirchhoff's laws and interpret about them with examples.	CO1
2	State and explain Kirchoff's current law, Kirchoff's voltage law and Ohms law with suitable examples.	Understand	The learner to recall Ohms law and understand the various elements.	CO1
3	State and explain Kirchhoff's voltage law and Kirchhoff's current law with neat diagram.	Remember	–	CO1
4	State Kirchhoff's voltage law and Kirchhoff's current law. Make short notes on practical sources and ideal sources.	Understand	The learner to recall series and parallel circuits and understand the equivalent inductance	CO1
5	Estimate the equivalent capacitance of series and parallel connections of capacitor elements.	Understand	The learner to recall series and parallel circuits and understand the equivalent capacitance.	CO1
6	List out the expressions of star to delta and delta to star transformation	Remember	–	CO1
7	Describe the method used to determine loop currents for multiple loop network with an neat example.	Understand	The learner to recall mesh analysis and understand about it to find mesh currents.	CO1
8	Summarize the procedure to calculate node voltages of an electrical network using nodal analysis.	Remember	–	CO1
9	Define the terms peak, peak to peak, average, RMS values, peak factor and form factor of sine wave.	Remember	–	CO2

10	Derive the expression for average and RMS values of sine wave.	Apply	The learner to recall the alternating quantity and understand the average and RMS values of sine wave and derive the its expressions.	CO2
11	Explain the Concept of reactance, impedance, susceptance and admittance, rectangular and polar form.	Understand	The learner to recall impedance and admittance and understand the rectangular and polar form.	CO2
12	Estimate the equivalent resistance of series and parallel connections of resistance elements.	Remember	–	CO2
13	Derive the equivalent resistance equations when they are connected in series and parallel.	Apply	This would require the learner to recall the concept of resistance and understand their connection in series and parallel and calculate its equivalent resistance.	CO1
14	Derive the expressions for equivalent resistances while transforming from star to delta and delta to star.	Apply	The learner to recall star to delta configuration and understand star to delta transformation and derive the transformation equations..	CO1
15	Derive the equivalent inductance equations when they are connected in series and parallel.	Apply	This would require the learner to recall the concept of inductance and understand their connection in series and parallel and calculate its equivalent inductance.	CO1
16	Why it is not possible to have electrolysis by A.C?	Remember	–	CO2

17	Mention the process of a sinusoidal voltage waveform (ac) generation? Also list the expressions of the average and rms values of the periodic voltage or current waveforms, are computed?	Rememeber	–	CO2
18	Derive the equivalent capacitance equations when they are connected in series and parallel.	Apply	This would require the learner to recall the concept of capacitance and understand their connection in series and parallel and calculate its equivalent capacitance.	CO1
19	Mention the difference between instantaneous ,peak and RMS quantities and give some examples of when it is appropriate to use each one.	Remember	–	CO2
20	Write short notes on star-delta transformation. If Rab, Rbc and Rca are connected in delta, derive the expressions for equivalent star connection.	Apply	The learner to recall star-delta transformation and understand about trasnformation from one form to another.	CO2
PART-C SHORT ANSWER QUESTIONS				
1	State and summarize the potential difference.	Remember	—-	CO 1
2	Define current, resistance	Remember	—-	CO 1
3	Give the expression for voltage in terms of W and Q.	Remember	—-	CO 1
4	Give the charge of an electron.	Remember	—-	CO 1
5	State OHM's law.	Remember	—-	CO 1
6	State Kirchhoff's current and Kirchhoff's voltage laws.	Remember	—-	CO 1
7	Define the power and energy.	Remember	—-	CO 1
8	Describe the active elements, passive elements.	Remember	—-	CO 1

9	Calculate the equivalent resistance of the circuit if applied voltage is 23V and Current flowing through circuit is 4A, receiving a power of 92W.	Understand	This would require the learner to recall the RLC circuit and understand the voltage, current and power relation.	CO 2
10	Give the difference between nodal analysis and mesh analysis	Remember	–	CO1
11	Define the alternating quantity.	Remember	–	CO2
12	Give the difference between periodic and non-periodic wave form.	Remember	–	CO2
13	If three equal value resistors with R= 3 ohms are in delta, determine their equivalent values in star connection.	Remember	–	CO1
14	If three equal value resistors with R=3 ohm are in star , determine their equivalent values in delta connection	Understand	This would require the learner to recall the star to delta transformation and understand the transformation equations.	CO1
15	Summarize the limitations of mesh analysis.	Understand	The learner to recall KVL and understand the limitations of mesh analysis.	CO1
16	Summarize the limitations of nodal analysis.	Understand	The learner to recall KCL and understand the limitations of mesh analysis	CO1
17	Represent the alternating current and voltage in terms of sine function.	Remember	–	CO1
18	Define reactance	Remember	–	CO1
19	Define impedance	Remember	–	CO1
20	Define the average, RMS value also peak and form factor of sine function.	Understand	The learner to recall the sine wave and understand the magnitude and different values related to an AC sine wave.	CO1
MODULE II				
NETWORK THEOREMS AND THREE- PHASE VOLTAGES				

<table>
<tr><th colspan="5">PART-A PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS</th></tr>
<tr><td>1</td><td>Determine the current flowing through 3 ohms resistor using Norton's theorem. If the circuit is as below.
</td><td>Apply</td><td>The learner to recall the Norton's theorem and understand its equivalent circuit with just a single current source and parallel resistance connected to a load and apply it to the given circuit.</td><td>CO2</td></tr>
<tr><td>2</td><td>Determine the current flowing through 3 ohms resistor using thevenin's theorem. If the circuit is as below.
</td><td>Apply</td><td>The learner to recall the thevenins theorem and understand its equivalent circuit with just a single voltage source and series resistance connected to a load and apply it to the given circuit.</td><td>CO2</td></tr>
<tr><td>3</td><td>Find out the current flowing in 3 resistor in the circuit shown in Figure using Nortons theorem
</td><td>Apply</td><td>The learner to recall the super-position theorem and understand it to apply for the given circuit.</td><td>CO2</td></tr>
<tr><td>4</td><td>In a series circuits source resistance is 45 ohms and load resistor is RL with 20V DC supply. If RL is variable of resistances10,20,30,40,45, 50,60, 70 ohms respectively.Calculate for what resistance of load maximum power is transferred, maximum power value, current and voltage drops in each case</td><td>Apply</td><td>The learner to recall the power transfer concept and understand the maximum external power from a source with a finite internal resistance and apply it to the given for the verfification.</td><td>CO2</td></tr>
</table>

5	Three impedance each 5 +j12 Ω is connected in star are connected to a 220 V three phase, 50HZ supply. Calculate the line currents and the power drawn by the circuit	Understand	This would require the learner to recall the expressions of line currents in star and calculate it form given data.	CO 2
6	A three phase balanced delta connected load of (4+j8) Ω is connected across a 400V, 3-Ø balanced supply. Determine the phase currents and line currents. Assume the phase of sequence to be RYB. Also calculate the power drawn by load.	Understand	This would require the learner to recall the expressions of phase currents in deltaand calculate it form given data.	CO 2
7	An unbalanced four-wired star –connected load has a balanced supply voltage of 400V.the load impedances are ZR =4+j8; ZY=3+j4; and ZB =15+j20;calculate the line currents, neutral current and the total power, also draw the Phasor diagram.	Understand	This would require the learner to recall the expressions of line currents in star and calculate it form given data.	CO 2
8	Determine the line currents and total power supplied to a delta connected load of Zab=10 , Zbc =20 , Zca=25 . Assume three phase 400 V abc systems.	Understand	This would require the learner to recall the expressions of line currents in deltaand calculate it form given data.	CO 2
9	A symmetrical, three phase, three wire 440V, and supply is connected to a star-connected load. The impedances are ZR =2+j3; ZY=1-j2; and ZB =3+j4; find its equivalent delta-connected load. The phase sequence is RYB.	Understand	This would require the learner to recall the expressions of line currents in star and calculate it form given data.	CO 2
10	A symmetrical, three phase, three wire 400V, and supply is connected to a delta-connected load. The impedances are ZRY=10 , Zbc =20 , Zca=25 . Find its equivalent star -connected load. The phase sequence is abc.	Understand	This would require the learner to recall the expressions of line currents in deltaand calculate it form given data.	CO 2

11	A balanced three phase is connected to balanced 3 - phase power system. The line voltage is 480 volts and the line current is 10 A. the angle of the phase impedance of the load 60. Find the complex power and real power absorbed by the load	Understand	This would require the learner to recall the expression of two wattmeter's method and calculate it form given data.	CO 2
12	Calculate the total power input and readings of the two wattmeter connected to measure power in a three –phase balanced load, if the reactive power input is 15KVAR,and the load pf is 0.8	Understand	This would require the learner to recall the expression of two wattmeter's method and calculate it form given data.	CO 2
PART-B LONG ANSWER QUESTIONS				
1	Explain the steps in calculating the Thevenin's voltage. State the application of Thevenin's theorem.	Apply	The learner to recall the super-position theorem and understand it to apply for the given circuit.	CO2
2	State Thevenin's theorem. Explain the steps to be followed to determine the equivalent circuit while applying Thevenin's theorem to DC network.	Apply	The learner to recall the linear circuit and understand the ratio of source to excitation even their positions are interchangedand apply it for the given circuit.	CO2
3	State and prove Thevenin's theorem and explain with an example for DC excitation.	Apply	The learner to recall the thevenins theorem and understand its equivalent circuit with just a single voltage source and series resistance connected to a load and apply it to the given circuit.	CO2

4	State and prove Thevenin's theorem with an example for DC excitation.	Apply	The learner to recall the Norton's theorem and understand its equivalent circuit with just a single current source and parallel resistance connected to a load and apply it to the given circuit.	CO2
5	State and verify maximum power transfer theorem with an example for DC excitation.	Apply	The learner to recall the power transfer concept and understand the maximum power transfered from a source with a finite internal resistance and apply it for the given circuit.	CO2
6	Explain the Thevenin's equivalent circuit with their importance.	Understand	The learner to recall the thevenins theorem and understand its equivalent circuit with just a single voltage source and series resistance connected to a load and apply it to the given circuit by knowing its importance.	CO2
7	Define symmetrical system and explain the concept of balanced load.	Understand	–	CO 2
8	Three identical impedances are star connected across 440V; 50HZ supply. The three line currents are IR =20∠-40; IY=20∠-160; IR =20∠80; find the values of the elements. Total power and the readings of wattmeter to measure the power.	Understand	This would require the learner to recall the expression of two wattmeter's method and calculate it form given data.	CO 2

9	A 3-phase 500 V motor operates at a power factor of 0.4 and takes an input power of 30 kW. Two watt meters are employed to measure the input power. Find readings on each instrument.	Understand	This would require the learner to recall the expression of two wattmeter's method and calculate it form given data.	CO 2
10	Two wattmeter are used to measure power in a 3-phase three wire load. Determine the total power, power factor and reactive power, if the two wattmeter's read 1000W each, but of opposite sign	Understand	This would require the learner to recall the expression of two wattmeter's method and calculate it form given data.	CO 2
11	Two wattmeter are used to measure power in a 3-phase three wire load. Determine the total power, power factor and reactive power, if the two wattmeter's read 1000W each, both positive ii) 1000W each, but of opposite sign	Understand	This would require the learner to recall the expression of two wattmeter's method and calculate it form given data.	CO 2
12	State and prove the Maximum Power Transfer Theorem for the following case: The load resistance is equal to the source resistance	Apply	This would require the learner to recall the concept of maximum power transfer theorem and understand it to prove it.	CO2
13	Derive the relationship between line and phase voltage in a 3-phase unbalanced delta connected system.	Understand	–	CO2
14	Describe the Norton's equivalent circuit with their importance.	Understand	The learner to recall the Thevenin's ,Norton's theorem and understand the norton equivalent circuit is a source transformation of the thevenin equivalent circuit.	CO2

15	Mention and prove reciprocity theorem with an example for DC excitation.	Apply	The learner to recall the linear circuit and understand the ratio of source to excitation even their positions are interchangedand apply it for the given circuit.	CO2
16	Mention and verify thevenin's theorem with an example for DC excitation	Apply	The learner to recall the thevenins theorem and understand its equivalent circuit with just a single voltage source and series resistance connected to a load and apply it to the given circuit by knowing its importance.	CO2
17	Mention and verify Norton's theorem with an example for DC excitation.	Apply	The learner to recall the Norton's theorem and understand its equivalent circuit with just a single current source and parallel resistance connected to a load and apply it to the given circuit.	CO2
18	Mention and verify maximum power transfer theorem with an example for DC excitation.	Apply	The learner to recall the power transfer concept and understand the maximum external power from a source with a finite internal resistance and apply for it for the given circuit.	CO2
19	What is phase sequence? Explain its significance. What is the difference between RYB phase sequence and RBY phase sequence?	Understand	–	CO 2

20	Derive the relationship between line and phase quantities in a 3-phase balanced, star connectedsystem and draw the phasor diagram.	Understand	This would require the learner to recall the expressions of phase currents in star and Derive the relationship between line and phase quantities	CO 2
PART-C SHORT ANSWER QUESTIONS				
1	Summarize the importance of super-position theorem.	Understand	The learner to recall the super-position theorem and understand its validity.	CO2
2	List the limitations of super-position theorem.	Remember	–	CO2
3	State super-position theorem.	Remember	–	CO2
4	Summarize reciprocity theorem.	Remember	–	CO2
5	Give the application of reciprocity theorem	Remember	–	CO2
6	State Theveninn's theorem.	Remember	–	CO2
7	State Norton's theorem.	Remember	–	CO2
8	State maximum power transfer theorem	Remember	–	CO2
9	Give the application of maximum power transfer theorem	Remember	–	CO2
10	Summarize the importance of Thevenin's theorem.	Understand	The learner to recall the Thevenin's theorem and understand how to find current in a particular element.	CO2
11	Give the importance of Norton's theorem.	Remember	–	CO2
12	What are the advantages of a three phase system over a single phase system?	Remember	This would require the learner to recall three phase system and single phase system and outline the advantages	CO 2

13	Obtain the relationship between line and phase voltage in a 3-phase balanced star connected system.	Remember	This would require the learner to recall 3-phase balanced star connected system and Obtain the relationship between line and phase voltage	CO 2
14	Obtain the relationship between line and phase voltage in a 3-phase balanced delta connected system.	Remember	This would require the learner to recall 3-phase balanced delta connected system and Obtain the relationship between line and phase voltage	CO 2
15	Write the equations of line voltages in a balanced 3 phase system?	Remember	–	CO 2
16	Obtain the relationship between line and phase current in a 3-phase balanced star connected system.	Remember	This would require the learner to recall 3-phase balanced star connected system and Obtain the relationship between line and phase currrent	CO 2
17	Obtain the relationship between line and phase currents in a 3-phase balanced delta connected system.	Remember	This would require the learner to recall 3-phase balanced delta connected system and Obtain the relationship between line and phase current	CO 2
18	Write the expression for power factor in an ac circuit?	Remember	–	CO 2
19	Write the expression for reactive power in a balanced 3 phase circuit?	Remember	–	CO 2
20	define planar and non-planar network?	–	CO2	
MODULE III				
ELECTRICAL MACHINES AND SEMICONDUCTOR DIODES				
PART A-PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS				

1	A DC shunt generator with supply voltage of 200V is generating a load current of 10 A, armature resistance is 0.5 ohm, shunt field resistance is 100 Ohm. If brush drop is 1 V/brush, find out emf generated.	Apply	This would require learner to recall EMF equation of DC generator and understand it to apply for the given problem.	CO3
2	A 4 pole DC shunt generator with wave connected armature has 41 slots and 12 conductors per slot. Ra = 0.5 ohm, Rsh = 200 ohm and flux per pole is 125Wb. When the generator is driven at a speed of 1000 rpm, calculate the voltage across 10 ohm load resistance connected across the armature terminals.	Apply	This would require learner to recall EMF equation of DC generator and understand it to apply for the given problem.	CO3
3	A 4 pole DC generator having wave wound armature has 50 slots and 25 conductors per slot. Find the generated EMF. if it is driven at 25rpm and useful flux per pole in the machine is 0.03 Wb.	Apply	This would require learner to recall EMF equation of DC generator and understand it to apply for the given problem.	CO3
4	A shunt generator delivers 450A at 230V and the resistance of the shunt field and armature are 50 ohm and 0.03 ohm respectively. Calculate the generated emf.	Apply	This would require learner to recall EMF equation of DC generator and understand it to apply for the given problem.	CO3
5	A 25KW, 250V DC shunt generator has armature and field resistances of 0.06 ohms and 100 ohms respectively. Determine the total armature power delivered when working (i) As generator delivering 25KW output and (ii) As motor taking 25KW input.	Apply	This would require learner to recall EMF equation of DC generator and understand it to apply for the given problem.	CO3
6	A 250 V, shunt motor takes a total current of 20 A. The shunt field and armature resistances 200 ohm and 0.3 ohms respectively. Determine ii) Back EMF iii) Gross mechanical power developed in armature.	Apply	This would require learner to recall EMF equation of DC generator and understand it to apply for the given problem.	CO3

7	A DC shunt motor rated 50 kW connected to a 250 V supply is loaded as to draw 200 A when running at a speed of 1250 rpm. Given Ra = 0.22 ohm // i) Determine the load torque if the rotational loss (including iron loss) is 600 W.// ii) Determine the motor efficiency if the shunt field resistance is 125 Ω..	apply	This would require learner to recall basic relation between speed and resistance of field and armature windings and understand the calculation of speed.	CO3
8	A 440 V DC shunt motor takes a no load current of 2.5A. The resistance of shunt field and the armature are 550 ohm and 1.2 ohm respectively. The full load line current is 32 A. Find the full load output and the efficiency of the motor.	apply	This would require learner to recall basic relation between speed and resistance of field and armature windings and understand the calculation of load torque.	CO3
9	A 220V, 4 pole shunt motor has 540 lap wound conductors. It takes 32A from the supply mains and develops output power of 5.595KW. The field winding takes 1A. The armature resistance is 0.9 ohms and the flux per pole is 30 mWb. Calculate i) The speed and ii) The torque developed in newton meters.	apply	This would require learner to recall winding structures and speed control strategies of DC motor and understand the calculation of load torque.	CO3
10	A 440 V DC shunt motor takes a no load current of 2.5A. The resistance of shunt field and the armature are 550 ohm and 1.2 ohm respectively. The full load line current is 32 A. Find the full load output and the efficiency of the motor.	apply	This would require learner to recall performance characteristics of DC motor and understand the calculation of Efficiency.	CO3
		CIE - II		
11	Compute the value of DC resistance and AC resistance of a Germanium junction diode at 25^0C with reverse saturation current, $I_0 = 25\mu$A and at an applied voltage of 0.2V across the diode.	Understand	Learner to recall the formula for static and dynamic resistances. Then extend to compute the static and dynamic resistances.	CO 4

12	The reverse saturation current of a silicon pn function diode at an operating temperature of 27^0C is 50nA. Compute the forward and reverse dynamic resistances of the diode for applied voltages of 0.8V and -0.4V respectively.	Understand	Learner to recall the formula for static and dynamic resistances. Then extend to compute the static and dynamic resistances.	CO 4
13	A Full wave single phase rectifier makes use of 2 diodes, the internal forward resistance of each is considered to be constant and equal to 30Ω. The load resistance is 1KΩ. The transformer secondary voltage is 200-0-200V (RMS). Solve I_{DC}, V_{DC} and ripple factor.	Apply	Learner to define the dc voltage, dc current and ripple factor. Then show the formulas for the full wave rectifier. Then assigning values for parameters to solve dc voltage, dc current and ripple factor	CO 4
14	A half wave rectifier is used to supply 24V DC power to a resistive load of 500Ω and the diode has a forward resistance of 50Ω. Solve the maximum value of the AC voltage required at the input.	Apply	Learner to define the dc power for a rectifier. Then show the formulas for the half wave rectifier. Then assigning values for parameters to solve the required amount of input voltage needed to deliver given power	CO 4
15	A full wave rectifier has a center tapped transformer 100-0-100 V. Each one of the diode is rated at Imax of 400mA. Neglecting the voltage drop across the diodes. Solve i. Efficiency ii. DC output voltage iii. DC load current and iv. PIV of each diode	Apply	Learner to define the dc voltage, dc current, dc power and PIV. Then show the formulas for the full wave rectifier. Then assigning values for parameters to solve dc voltage, dc current, power and peak inverse voltage.	CO 4

16	A 230 V, 60Hz voltage is applied to the primary of a 5:1 step down, center tapped transformer used in a full wave rectifier having a load of 900Ω .If the diode resistance and the secondary coil resistance together has a resistance of 100Ω, Solve i) DC voltage across the load. ii) DC current flowing through the load iii) DC power delivered to the load iv) PIV across each diode.	Apply	Learner to define the dc voltage, dc current, dc power and PIV. Then show the formulas for the full wave rectifier. Then assigning values for parameters to solve dc voltage, dc current, power and peak inverse voltage.	CO 4
17	A full wave bridge rectifier having load resistance of 100Ω is fed with 220V, Assuming the diodes are ideal, Find the following terms, i) DC output voltage ii) Rectifier efficiency iii) Peak inverse voltage	Apply	Learner to define the dc voltage, efficiency and PIV. Then show the formulas for the full wave rectifier. Then assigning values for parameters to solve dc voltage, efficiency and PIV.	CO 4
18	Show a diode clipping circuit to convert 1KHz sine-wave of 20V peak to peak, to a symmetric square-wave of 4 volt peak to peak amplitude.	Understand	Learner to recall the clipper operation. Then show the clipper circuit to satisfy the given functionality	CO 4
19	A 230V, 50Hz voltage is applied to the primary of a 4:1 step-down transformer used in a bridge rectifier having a load resistance of 600Ω. Assuming the diodes to be ideal, Compute i. DC output voltage ii. DC power delivered to the load iii. PIV and iv. Output frequency.	Understand	Learner to define the dc voltage, power and PIV. Then extend to compute the required parameters.	CO 4

20	A half-wave rectifier, having a resistive load of 1000Ω, rectifies an alternating voltage of 325V peak value and the diode has a forward resistance of 100Ω. Compute i. Peak, average and RMS values of current ii. DC power output iii. AC input power and iv. Efficiency of the rectifier.	Understand	Learner to define the Peak, average, RMS values of current, DC power output and efficiency of the rectifier. Then extend to compute the required parameters.	CO 4
PART-B LONG ANSWER QUESTIONS				
1	State the principle of DC generator. Explain the working of DC generators with neat diagrams.	Understand	This would require learner to recall Faradays laws of electromagnetic induction and Lenz's law and understand the construction of DC machine.	CO3
2	Write the equation for the generated emf in a DC generator. Describe various types of self excited DC generators with their circuit layout.	Apply	This would require learner the operation of DC generator and understand it to derive the EMF equation.	CO4
3	Classify types of DC generators and explain in detail the various losses of DC generator.	Understand	This would require learner the operation of DC generator and understand various types of them.	CO3
4	What are the constructional parts present in the DC generator? Briefly explain about their functionality in the operation of DC generator.	Understand	This would require learner to recall B-H curve and retentivity properties of ferromagnetic materials and understand the condition for self-excitation.	CO3
5	Explain the process of voltage build up in self-excited DC generators and state the conditions for separately excitation.	Remember	–	CO3

6	Classify and describe the different types of characteristics for a DC shunt generator.	Understand	This would require learner to recall operation of DC shunt generator and understand its different characteristics.	CO3
7	Classify and describe the different types of characteristics for a DC series generator.	Understand	This would require learner to recall operation of DC series generator and understand its different characteristics.	CO3
8	Interpret the constructional features of a DC machine with the help of neat sketches .	Understand	This would require learner to recall and understand the construction of DC machine.	CO3
9	Interpret the principle of operation of DC motors.	Understand	This would require learner to recall Faradays laws of electromagnetic induction and lenzs laws and understand the operation of DC motor.	CO3
10	Derive the torque equation of a DC motor.	Apply	This would require learner to recall basic electromechanical energy conversion principle used in DC motor and understand it to derive the torque equation.	CO3
11	Describe the different types of motors with equivalent circuits	Understand	This would require learner to recall basics of principle of DC motor and understand its various types.	CO3
12	Explain the different characteristics of DC motors with neat sketches.	Understand	This would require learner to recall basics of principle of DC motor and understand its various types.	CO3

13	List the applications of DC series, DC shunt and DC compound motors.	Remember	This would require learner to recall various types of DC motors and understand suitable applications of them.	CO3
14	State the factors that affect the speed of a DC motor?	Remember	–	CO3
15	Describe the different types of losses occurred in DC motors.	Understand	This would require learner to recall the operation of DC motor and understand various losses in it.	CO3
16	List and describe the parts of a DC motor. State how a commutator and brushes deliver voltage to the armature.	Understand	This would require learner to recall the construction of DC motor and understand function of each part.	CO3
17	Discuss and differentiate DC series motor, shunt motor and compound motor.	Understand	This would require learner to recall different types of DC motors and understand their applications.	CO3
18	Explain the back EMF in a DC motor. What is the importance of back EMF in a DC machine?	Understand	This would require learner to recall basics of principle of DC motor and understand about back EMF.	CO3
19	With the help of neat sketches, explain torque speed characteristics of i) DC series ii) DC Shunt motor	Understand	This would require learner to recall performance characteristics of DC motors.	CO3
20	Describe the relationship between speed, torque, and horsepower.	Understand	This would require learner to recall concepts of speed, torque, and horsepower and understand relation between them..	CO4
CIE - II				

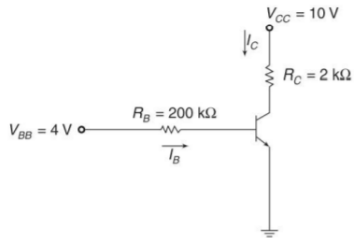
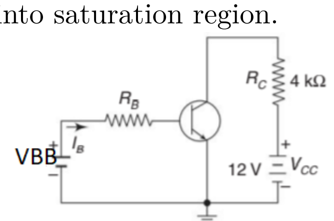
21	Outline the V-I characteristics of pn junction diode for forward bias and reverse bias voltages and represent the static and dynamic resistance of the diode in the characteristic curve.	Understand	Learner to recall the pn diode operation. Then draw V-I characteristics based on applied bias and illustrate the static and dynamic resistances of diode.	CO 4
22	Contrast the static and dynamic resistances of a pn diode and derive its dynamic resistance	Understand	Learner to recall the resistances of diode. Then contrast static and dynamic resistances of diode.	CO 4
23	Explain the following terms for a pn diode 1. Load line 2. Diode switching times.	Understand	Learner to recall the diode operation. Then explain the load line analysis and diode switching timing parameters	CO4
24	Demonstrate the working of half-wave rectifier with circuit diagram and waveforms.	Understand	Learner to recall the rectifier operation. Then demonstrate the working principle of half wave rectifier.	CO 4
25	Illustrate transition capacitance and diffusion capacitance With suitable expression.	Understand	Learner to recall the biasing of diode. Then demonstrate the effect of capacitances across the diode.	CO 4
26	Illustrate the working principle of bridge full wave rectifier with circuit diagram and waveforms.	Understand	Learner to recall therectifier function. Then explain the working principle of bridge rectifier.	CO 4
27	List the types of filters used in rectification. Derive the expression for ripple factor using C-filter.	Remember	–	CO 4
28	Illustrate the rectification efficiency and derive expression for the following 1. Half wave rectifier 2. Full wave rectifier	Understand	Learner to define rectifier efficiency. Then relate for finding half wave and full wave rectifiers efficiency.	CO 4

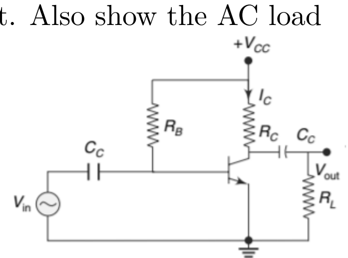
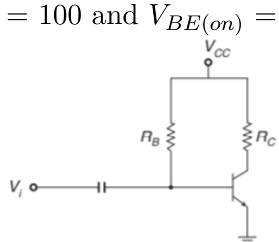
29	Derive the following rectifier parameters for half wave rectifier: i) Efficiency ii) Average or DC voltage iii) Ripple factor.	Remember	–	CO 4
30	Define and estimate the expressions of the following for the full wave rectifier: i) PIV ii) TUF iii) Ripple factor.	Remember	–	CO 4
31	Explain the formation of depletion region in an open circuited pn junction with neat sketches and draw its energy band diagrams.	Understand	Learner to recall the construction of pn junction diode. Then explain the causes for formation of depletion region for unbiaseddiode	CO 4
32	Explain the DC load line analysis of pn junction diode with relevant expressions.	Understand	Learner to define the load line for diode. Then explain the DC load line using the VI characteristics	CO 4
33	Infer the pn diode as switch and list switching timings.	Understand	Learner to recall the operation of diode. Then infer the diode to use as a switch.	CO 4
PART-C SHORT ANSWER QUESTIONS				
1	State the principle of DC generator.	Remember	–	CO3
2	List out the rotating parts and stationary parts in DC machine.	Understand	This would require learner to recall basics of magnetic circuits and understand its importance.	CO3
3	Explain why electro magnets are preferred over permanent magnets in large DC machines?	Understand	This would require learner to recall basics of magnetic circuits and understand the concept of permanent magnet.	CO3

4	Explain why the armature core of a DC machine is laminated.	Understand	This would require learner to recall basics of magnetic circuits and understand the concept of laminations.	CO3
5	List out the different types of DC generators and write its applications.	Remember	–	CO3
6	Write the EMF equation of a DC generator.	Remember	–	CO4
7	Classify the different types of DC generators.	Remember	–	CO3
8	Differentiate DC motor from a DC generator.	Remember	–	CO3
9	Define the principle of operation of DC motor.	Remember	–	CO3
10	Explain why the EMF generated in the armature of a DC motor is called the back EMF?	Understand	This would require learner to recall Faradays laws of electromagnetic induction and lenzs laws and understand the back emf.	CO3
11	Write the expression for torque produced in DC motor.	Remember	–	CO3
12	List out the different types of DC motors.	Remember	–	CO3
13	State the condition for maximum power developed in DC motor.	Understand	This would require learner to recall concept of back EMF and understand its effect on terminal voltage.	CO3
14	Describe why a series motor should not be run without load.	Understand	This would require learner to recall performance characteristics of DC series motor and understand the series motor.	CO3
15	List out the different types of losses occurred in DC motors.	Remember	–	CO3

16	Define hysteresis and eddy current losses	Remember	–	CO3
17	Describe how the eddy current and hysteresis losses be minimized	Remember	–	CO3
18	Describe about core losses and copper losses in DC machines.	Remember	–	CO3
19	Define the speed regulation for a DC motor.	Remember	–	CO3
20	Explain the back EMF of DC motor.	Remember	–	CO3
CIE - II				
1	Show the static resistance of pn diode from V-I characteristics.	Remember	–	CO 4
2	Define static resistance and dynamic resistance of pn junction diode.	Remember	–	CO 4
3	List the applications of diode.	Remember	–	CO 4
4	Outline the V-I characteristics of pn junction diode.	Understand	Learner to recall the behavior of pn junction with applied bias. Then outline the V-I characteristics of diode	CO 4
5	List the differences between ideal diode and practical diode.	Remember	–	CO 4
6	How diffusion capacitance is occurred in pn junction diode.	Remember	–	CO 4
7	Show the expression for transition capacitance in pn junction diode.	Remember	–	CO 4
8	Explain drift current in pn diode.	Understand	Learner to recall the conduction of diode in biasing. Then explain drift current component in pn diode	CO 4
9	Plot the DC and AC load line of a diode.	Understand	Learner to recall the diode characteristics. Then demonstrate the load line analysis of diode	CO 4

10	Outline the concept of diode acts as switch.	Understand	Learner to recall the diode operation. Then explain how the diode is used as switch	CO 4
11	Show the expression of ripple factor of half wave rectifier.	Understand	Learner to recall the definition of ripple factor. Then show the expression of ripple factor of the half wave rectifier.	CO 4
12	What is the dynamic resistance of pn junction diode?	Remember	–	CO 4
13	List the types of rectifiers.	Remember	–	CO 4
14	Classify the recovery times in pn diode.	Understand	Learner to recall the switching times of diode. Then classify the various recovery times of pn diode	CO 4
15	Outline the forward recovery time of pn junction diode.	Understand	Learner to recall the switching times of diode. Then summarize the significance of forward recovery time	CO 4
MODULE IV				
BIPOLAR JUNCTION TRANSISTOR AND APPLICATIONS				
PART A- PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS				
1	A transistor has I_B=100μA and I_C =2 mA. Solve i. β of the transistor ii. α of the transistor iii. Emitter current I_E and iv. If I_B changes by + 25 mA and I_C changes by + 0.6 mA, find the new value of β.	Apply	Learner to recall the transistor operation, then show the formula to solve the parameters.	CO 6

2	Solve the base, collector, and emitter currents and V_{CE} for the CE circuit shown in below Fig. For $V_{CC} = 10$V, $V_{BB} = 4$V, $R_B = 200\text{K}\Omega$, $R_C = 2\text{K}\Omega$, $V_{BE(on)} = 0.7$V, $\beta = 200$. 	Evaluate	Learner to recall the CE operation, then show the formula to solve the currents related to base, emitter and collector.	CO 6
3	Given an NPN transistor for which α= 0.98, $I_{CO} = 2\mu$A, and I_{CEO}=16μA. A common-emitter connection is used as shown in below Fig. with $V_{CC} = 12$V and $R_C = 4\text{K}\Omega$. What is the minimum base current required in order for the transistor to enter into saturation region. 	Apply	Learner to recall the transistor operation in CE mode. Then relate base current for CE transistor.	CO 6
4	In a common-base connection, the emitter current I_E is 6.28 mA and the collector current I_C is 6.20 mA. Estimate the α, β, and γ	Analyze	Learner to recall their formulae, summarize what factors are acting and apply those formulate to examine the current gain in CB	CO 6
5	The reverse leakage current of the transistor when connected in CB configuration is 0.2μA and it is 18μA when the same transistor is connected in CE configuration. Solve α_{dc} and β_{dc} of the transistor.	Evaluate	Learner to recall the CB operation, then show the formula to solve the gains related to CB.	CO 6

6	A transistor operating in CB configuration has $I_C = 2.98$mA, $I_E = 3$mA and $I_{C0} = 0.01$mA. Solve which current will flow in the collector circuit of this transistor when connected in CE configuration with base current of 30μA.	Apply	Learner to recall the CB operation, then show the formula to solve the current with CE and CB configurations.	CO 6
7	A silicon transistor with $V_{BE} =$ 0.7V, $\alpha = 0.98$ and collector cut-off current of 10 μ A. Assume R_C=2KΩ, V_{CC} = 12V and I_B = 10μA. solve β, I_{CE0}, I_C, I_E and V_{CE}.	Apply	Learner to recall the CE operation, then show the formula to solve the β, I_{CE0}, I_C, I_E and V_{CE}.	CO 6
8	A certain transistor has α of 0.98 and a collector leakage current I_{C0} of 25 μA. find the collector and base currents, when I_E= 2 mA.	Remember	–	CO 6
9	In the transistor amplifier shown in below Fig. R_C=8KΩ, R_L = 24KΩ, R_B=100KΩ and V_{CC} = 24 V. Show the DC load line and determine the optimum operating point. Also show the AC load  line.	Understand	Learner to recall the transistor operation in CE mode. Then show load line analysis and Q-point	CO 8
10	Show the collector current shown in below Fig. given Q-point values are to be I_{CQ} = 1mA and V_{CEQ} = 6V. Assume that V_{CC} = 10V, β = 100 and $V_{BE(on)}$ = 0.7 V. 	Understand	Learner to recall the transistor operation in CE mode. Then show collector current.	CO 8
PART-B LONG ANSWER QUESTIONS				

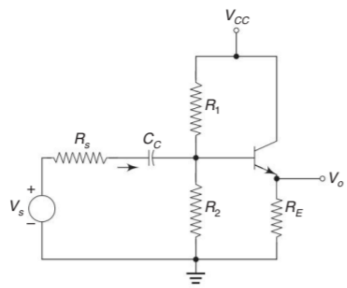
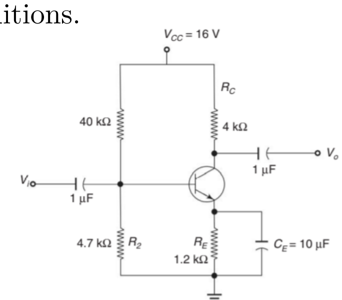
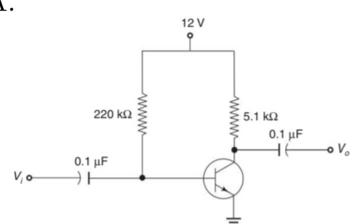
1	Explain the various current components in an NPN bipolar junction transistor With a neat diagram.	Understand	Learner to recall the transistor operation. Then relate the current components in BJT.	CO 5
2	Define current gain parameters of a CE, CB and CC transistor and relate parameters	Understand	Learner to recall the transistor operation. Then relate the current gain parameters in BJT	CO 5
3	Demonstrate the working of transistor in common emitter configurations and draw its input and output characteristics.	Understand	Learner to recall the transistor construction. Then demonstrate the CE configuration	CO 5
4	Explain working of transistor in common base configurations and draw its input and output characteristics.	Understand	Learner to recall the transistor construction. Then demonstrate the CB configuration	CO 5
5	Explain working of transistor in common collector configurations and draw its input and output characteristics.	Understand	Learner to recall the transistor construction. Then demonstrate the CC configuration	CO 5
6	Show the h-parameters of a bipolar junction transistor in a small signal model.	Understand	Learner to recall the hybrid model of transistor. Then show the parameters of BJT from h-model	CO 5
7	Define active region and connect PNP and NPN transistors in active region.	Understand	Learner to recall active region and draw transistor in active region	CO 5
8	The transistor has I_E=10 mA and $\alpha = 0.98$. Find the values of I_C and I_B.	Remember	–	CO 5

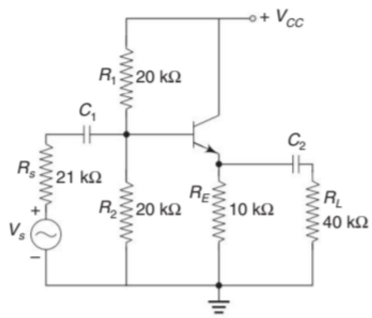
9	Determine the h-parameters from the common emitter configuration using NPN transistor.	Evaluate	This would require: to recall the small signal model, illustrate the operation of common emitter transistor operation, then apply the h-model to the CE configuration of transistor to analyze the physical scenario to estimate h-parameters	CO 5
10	Examine the validity of approximate hybrid model applicable in low-frequency region.	Analyze	Learner to recall their h-model, understand what factors are acting and apply those formulate to examine approximate hybrid model.	CO 5
11	Define cutoff region and connect PNP and NPN transistors in cutoff region.	Understand	Learner to recall cutoff region and draw transistor in cutoff region	CO 5
12	Explain the DC and AC load line analysis of a BJT.	Understand	Learner to recall the load line analysis then illustrate Dc and AC load line for transistor.	CO 5
13	In a common-base connection, the emitter current I_E is 6.28 mA and the collector current I_C is 6.20 mA. Find the common-base dc current gain.	Remember	–	CO 5
14	If a transistor has a value of α is 0.97, find the value of β. If $\beta =$ 200, find the value of α.	Remember	–	CO 5
15	A transistor has $\beta = 100$. If the collector current is 40 mA, find the value of the emitter current.	Remember	–	CO 5
16	For a transistor circuit having $\alpha=$ 0.98, $I_{CBO} = I_{CO}$ =5 μA, and I_B =100 μA, find I_C and I_E.	Remember	- -	CO 5

17	When the current of a transistor is changed by 1 mA, there is a change in collector current by 0.99 mA. Show the current gain of the transistor.	Understand	Learner to recall the amplification factors in transistor. Then show the current gain of the transistor.	CO 5
18	Illustrate the working principle of PNP transistor.	Understand	Learner to recall the transistor construction. Then demonstrate the transistor operation	CO 5
19	When I_E of a transistor is changed by 1mA, its I_C changes by 0.995 mA. Find its common-base current gain α, and common-emitter current gain β.	Remember	–	CO 5
20	Illustrate the working principle of NPN transistor.	Understand	Learner to recall the transistor construction. Then demonstrate the transistor operation	CO 5
PART-C SHORT ANSWER QUESTIONS				
1	Show the bipolar junction transistor and label the terminals of transistor.	Understand	Learner to recall the construction of transistor. Then show the terminals of transistor	CO 5
2	Define the current gain of common base configuration.	Remember	-	CO 5
3	Show the symbols of NPN and PNP transistor.	Remember	-	CO 5
4	Define the current gain of common emitter configuration.	Remember	-	CO 5
5	Relate α, β and γ in bipolar transistor.	Understand	Learner to define the amplification factors of transistor configurations. Then relate the α,β and γ	CO 5
6	List h parameters of common emitter configuration.	Remember	–	CO 5
7	List h parameters of common base configuration.	Remember	–	CO 5
8	Recall base width modulation in bipolar junction transistor.	Remember	–	CO 5

9	List h parameters of common collector configuration..	Remember	–	CO 5
10	Define the current gain of common base configuration.	Remember	–	CO 5
11	When the transistor is said to be in cut-off region.	Remember	–	CO 5
12	List the various regions in a transistor and compare them with respect to doping and width.	Understand	Learner to recall the construction of transistor. Then compare regions in a transistor with respect to doping and width.	CO 5
13	Outline the output characteristics of NPN transistor in common emitter configuration.	Understand	Learner to recall the transistor operation. Then show the output characteristics in common emitter configuration	CO 5
14	Show the circuit of a common base configuration using PNP transistor.	Understand	Learner to recall the transistor operation. Then show the common base configuration circuit using PNP transistor.	CO 5
15	Show the relation between I_C, β, I_B and I_{CBO} in bipolar junction transistor.	Understand	Learner to recall the current expression of transistor in common configurations. Then relate the given parameters.	CO 5
16	What is the significance of the arrow-head in the transistor symbol?	Remember	–	CO 5
17	Show the active region for common emitter configuration using NPN transistor.	Understand	Learner to recall the transistor operation. Then show the common emitter configuration using NPN transistor in active region.	CO 5
18	Label the various current components in a BJT.	Remember	–	CO 5
19	Define current controlling devices and give example.	Remember	–	CO 5

20	Define DC and AC load lines of transistor.	Remember	–	CO 5
MODULE V				
TRANSISTOR AMPLIFIERS				
PART A-PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)				
1	In a Silicon transistor circuit with a fixed bias, V_{cc} = 15V, R_C = 3KΩ, R_B=100KΩ, β = 50, V_{BE} = 0.7V. Solve the operating point and stability factor.	Apply	Learner to recall the biasing, then illustrate the amplifier using fixed bias to solve the operating point and stability factor.	CO 6
2	Build a self-bias circuit as per the following specifications. V_{CC} =12V, V_{CE}=2V, I_C=4mA, R_E=2KΩ, h_{fe}=80. Show the complete diagram with the designed values.	Apply	Learner to recall the biasing, then illustrate the amplifier using self bias to solve the operating point and stability factor.	CO 6
3	In a Silicon transistor circuit with a fixed bias, V_{CC} =12V, R_C =330Ω, I_B=0.3mA, β = 100, V_{BE} = 0.7V. Solve the value of bias resistor R_B and Stability factor.	Apply	Learner to recall the biasing, then illustrate the amplifier using fixed bias to solve the parameters.	CO 6
4	In a Silicon transistor circuit with a collector to base bias, V_{CC} =10V, R_C = 10KΩ, R_B =1000KΩ, β = 50, V_{BE} = 0.7V. Identify the operating point and also draw the load line and locate Q point on it.	Apply	Learner to recall the biasing, then illustrate the amplifier using collector to base bias to solve the operating point.	CO 6
5	An NPN transistor with β =50 is used in a common emitter circuit with V_{CC}=10V,R_C = 2KΩ. The bias is obtained by connecting a 100KΩ resistance from collector to base. Assume V_{BE}=0.7V. Solve i. The quiescent point ii. The stability factor S.	Apply	Learner to recall the biasing, then illustrate the amplifier using collector to base to solve the operating point and stability factor.	CO 6

6	For the emitter follower shown in below Fig., the circuit parameters are $R_S = 500\Omega$, $R_1 = R_2 = 50\text{K}\Omega$, $R_L = 2\text{K}\Omega$, $h_{fc} = 100$, and $h_{ic} = 1.1\text{K}\Omega$ Determine the input resistance, output resistance, current gain and voltage gain. 	Evaluate	Learner to recall the emitter follower circuit, illustrate the operation of CC amplifier, then apply the h-model to the CC configuration of transistor to analyze the physical scenario to estimate the given parameters.	CO 6
7	Determine the input impedance, output impedance, voltage gain, and current gain of the CE amplifier of below Fig. using h-parameter model for the transistor with $h_{ie} = 3.2\text{K}\Omega$ and $h_{fe} = 100$ at the operating conditions. 	Evaluate	Learner to recall the CE amplifier, illustrate the operation of CE amplifier, then apply the h-model to the CE configuration of transistor to analyze the physical scenario to estimate the given parameters.	CO 6
8	Determine the input impedance, output impedance, voltage gain, and current-gain for the CE amplifier of below Fig. The h-parameters of the transistor of $h_{fe} = 60$, $h_{ie} = 500\ \Omega$ at $I_C = 3$ mA. 	Evaluate	Learner to recall the CE amplifier, illustrate the operation of CE amplifier, then apply the h-model to the CE configuration of transistor to analyze the physical scenario to estimate the given parameters.	CO 6

9	Solve the current gain, voltage gain, input resistance, and output resistance for the common collector amplifier shown in below Fig. The transistor parameters are h_{ic} = 1.4KΩ, h_{fc} = 100, h_{rc} = 1 , and h_{oc} = 20 × 10^6 A/V.  	Apply	Learner to recall the amplifier, then illustrate the CC amplifier to solve the parameters.	CO 6
10	A CE amplifier is drawn by a voltage source of internal resistance R_S= 800Ω and the load impedance is 1000Ω. The h-parameters are h_{ie}=1 kΩ, h_{re} = 2 × 10^4, h_{fe}=50 and h_{oe}=25 μ A/V .Compute the current gain, input resistance, voltage again and output resistance.	Evaluate	Learner to recall the CE amplifier, illustrate the operation of CE amplifier, then apply the h-model to the CE configuration of transistor to analyze the physical scenario to estimate the given parameters.	CO 6
PART-B LONG ANSWER QUESTIONS				
1	Solve the stability factor for voltage divider bias circuit using transistor with circuit diagram.	Apply	Learner to recall the voltage divider bias, then show the formula to solve the stability factor.	CO 6
2	Explain the two important factors to be considered while designing the biasing circuit which are responsible for shifting the operating point.	Understand	Learner to recall the Q-point. Then illustrate the q-point parameters with respect to the biasing.	CO 6
3	Construct collector to base bias using transistor and derive the expression for stability factor.	Apply	Learner to recall the collector to base bias, then show the formula to solve the stability factor.	CO 6

4	Derive the stability factor for fixed bias circuit using transistor with circuit diagram.	Analyze	Learner to: recall fixed bias, understand what factors are acting and apply those formulate to examine stability factor.	CO 6
5	Explain thermal runaway. What are the factors effecting the stability factor.	Understand	Learner to recall the thermal runaway in semiconductors. Then explain the thermal runaway which affects the stability in transistor.	CO 6
6	Demonstrate the bias compensation techniques in transistor using thermistor and sensistor.	Understand	Learner to recall the biasing and stabilization. Then explain stable Q-point is occurred with compensation techniques.	CO 6
7	Illustrate the operation of diode compensation technique to provide the stability in transistor.	Understand	Learner to recall the compensation in amplifiers. Then explain the stability of transistor using diode compensation	CO 6
8	Illustrate the operation of diode compensation technique for I_{CO} to provide the stability in transistor.	Understand	Learner to recall the compensation in amplifiers. Then explain the stability of transistor using diode compensation	CO 6
9	What is a heat sink? How does it contribute to increase in power dissipation?	Remember	–	CO 6
10	Illustrate the stability factor for a CB amplifier circuit using fixed bias.	Understand	Learner to recall the Q-point. Then illustrate the Q-point parameters to provide the constant stability factor using fixed bias.	CO 6

11	Solve the expressions for A_I, A_V, R_i and R_O for Common Emitter amplifier using low frequency model.	Apply	Learner to recall the common emitter amplifier, then show the formula to solve the A_I, AV, R_i and R_O.	CO 6
12	Model the frequency response of BJT amplifier and explain the effect of coupling capacitor on the frequency response in detail.	Apply	Learner to recall the common emitter amplifier, then illustrate the amplifier to model the amplifier..	CO 6
13	Show the circuit diagram of CC amplifier using hybrid parameters and derive the expression for A_I, A_V, R_i and R_O.	Understand	Learner to recall the concepts and hybrid parameters of common collector amplifier. Then outline the CC amplifier.	CO 6
14	Illustrate the approximate model for CE amplifier	Understand	Learner to recall the common emitter amplifier, then illustrate the amplifier to solve the parameters related to CB amplifier.	CO 6
15	Solve the expressions for A_I, A_V, R_i and R_O for Common base amplifier using low frequency model.	Apply	Learner to recall the common base amplifier, then illustrate the amplifier to solve the parameters related to CB amplifier.	CO 6
16	Solve the expressions for A_{IS}, A_{VS} and A_P for Common base amplifier using low frequency model.	Apply	Learner to recall the common base amplifier, then illustrate the amplifier to solve the parameters related to CB amplifier.	CO 6

17	Summarize CB, CE and CC amplifiers in terms of current gain, voltage gain, input impedance and output admittance.	Understand	Learner to recall the amplifiers using CE, CB and CC then Summarize the current gain, voltage gain, input impedance and output impedance.	CO 6
18	Solve the expressions for A_{IS}, A_{VS} and A_P for Common Emitter amplifier using low frequency model.	Apply	Learner to recall the common base amplifier, then illustrate the amplifier to solve the parameters related to CE amplifier.	CO 6
19	Solve the expressions for A_{IS}, A_{VS} and A_P for Common Collector amplifier using low frequency model.	Apply	Learner to recall the common base amplifier, then illustrate the amplifier to solve the parameters related to CC amplifier.	CO 6
20	Demonstrate CE amplifier with emitter resistance and derive the expression for A_I, A_V, R_i and R_O using hybrid model.	Understand	Learner to recall the current gain, voltage gain, input impedance and output impedance. Then demonstrate the CE amplifier with emitter resistance circuit.	CO 6
PART-C SHORT ANSWER QUESTIONS				
1	What is meant by the biasing of a transistor?	Remember	–	CO 6
2	Why the biasing is necessary in BJT amplifiers.	Remember	–	CO 6
3	List the stability factors in transistor.	Remember	–	CO 6
4	What factors are to be considered for selecting the operating point Q for an amplifier?	Remember	–	CO 6
5	Show the factors contribute to thermal instability.	Remember	–	CO 6

6	Sketch the circuit diagram of a collector to base biasing circuit of CE amplifier?	Understand	Learner to recall the biasing. Then outline the collector to base biasing for CE amplifier.	CO 6
7	Define S, $S^{'}$ and $S^{"}$ of a transistor.	Remember	–	CO 6
8	Plot the circuit diagram of a fixed bias circuit of CE amplifier.	Understand	Learner to recall the biasing. Then outline the fixed biasing for CE amplifier.	CO 6
9	Show a circuit employing a sensistor compensation.	Remember	–	CO 6
10	Find the stability factor for a CB amplifier circuit using Fixed bias.	Remember	–	CO 6
11	Why thermal runaway is occurred in transistors.	Remember	–	CO 6
12	What is the thermal resistance?	Remember	–	CO 6
13	Show the stability factor S.	Understand	Learner to recall the stability in transistor. Then relate the stability factor.	CO 6
14	How to overcome the thermal stability.	Remember	–	CO 6
15	Show the expressions for A_V and R_i of a CE amplifier.	Understand	Learner to recall the amplifier operation. Then interpret the voltage gain and input resistance of CE amplifier.	CO 6
16	Show the expressions for A_V and R_i of a CB amplifier.	Understand	Learner to recall the amplifier operation. Then interpret the voltage gain and input resistance of CB amplifier.	CO 6
17	Show the expressions for A_V and R_i of a CC amplifier.	Understand	Learner to recall the amplifier operation. Then interpret the voltage gain and input resistance of CC amplifier.	CO 6

18	Show the effect of bypass capacitor in amplifier.	Understand	Learner to recall the amplifier operation. Then explain the use bypass capacitor in amplifier.	CO 6
19	What is the effect of coupling capacitor?	Remember	–	CO 6
20	Show the expressions for A_I and R_O of a Common Emitter amplifier.	Remember	–	CO 6
21	Outline the frequency response of BJT amplifier.	Understand	Learner to recall the amplifier operation. Then outline the sponse of BJT amplifier	CO 6
22	Show the expressions for A_I and R_O of a Common Base amplifier.	Understand	Learner to recall the amplifier operation. Then interpret the current gain and output resistance of CC amplifier.	CO 6
23	List the expressions for A_I and R_O of a Common Collector amplifier signals.	Remember	–	CO 6
24	Find the expressions for A_{VS} and A_{IS} of a CE amplifier.	Remember	–	CO 6

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