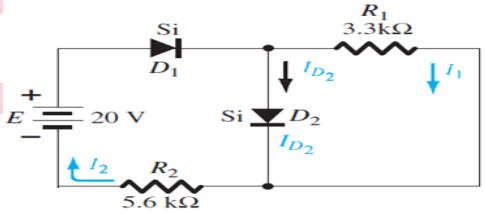
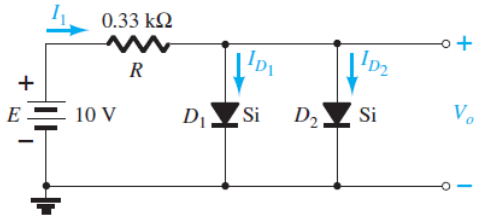
Meerut Institute of Engineering & Technology, Meerut

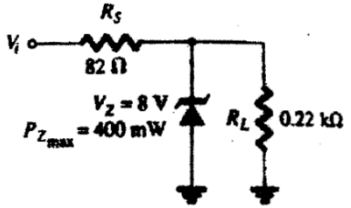
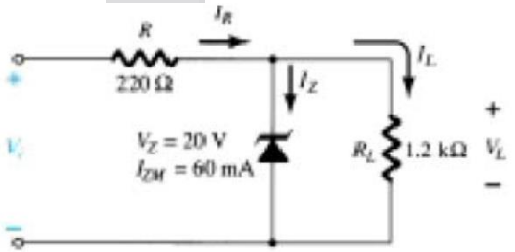
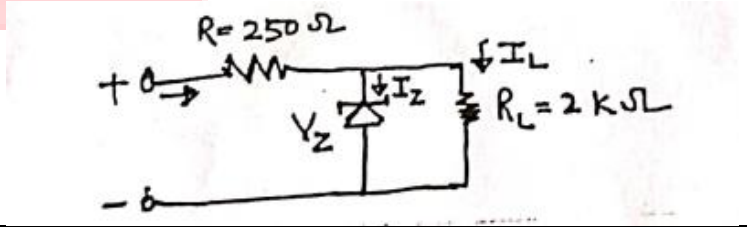
CO-Wise AKTU Question Bank

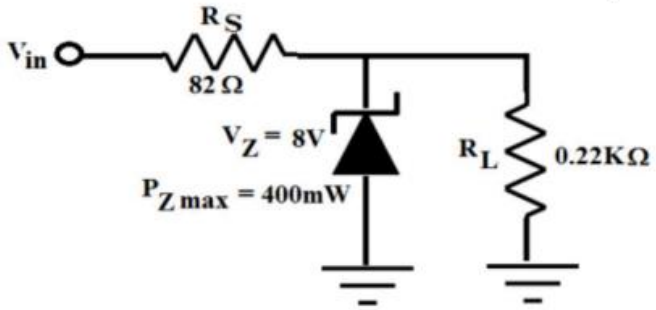
Course: B.Tech **Subject Name: Fundamentals of Electronics Engineering** **Subject Code: BEC101/201** **Semester: 1/2**

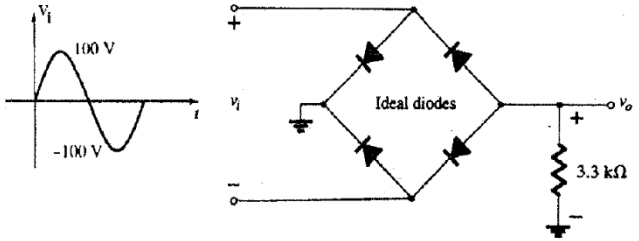
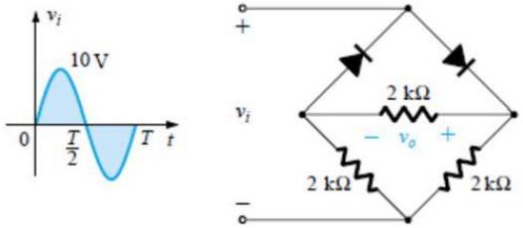
CO No.	Lect. No.	Syllabus Topic (As Per LP)	Ques. No.	Question Statement (As Per AKTU)	Session
1	**1**	Introduction of Semiconductors: Intrinsic & Extrinsic Semiconductors, Types of currents, Movement of electrons & holes etc.	**1.**	Why Si is preferred over Ge for the manufacturing of electronics devices.	2015-16
1	**1**	Introduction of Semiconductors: Intrinsic & Extrinsic Semiconductors, Types of currents, Movement of electrons & holes etc.	**2.**	Explain the effect of temperature on conductivity of a semiconductor.	2015-16
1	**1**	Introduction of Semiconductors: Intrinsic & Extrinsic Semiconductors, Types of currents, Movement of electrons & holes etc.	**3.**	Differentiate between N-type and P-type semiconductors.	2016-17
1	**1**	Introduction of Semiconductors: Intrinsic & Extrinsic Semiconductors, Types of currents, Movement of electrons & holes etc.	**4.**	Classify the materials with help of energy band	2016-17
1	**1**	Introduction of Semiconductors: Intrinsic & Extrinsic Semiconductors, Types of currents, Movement of electrons & holes etc.	**5.**	What do you mean by doping? Describe its need. OR What is doping? What is the need of Doping?	2018-19, 2020-21, 2021-22
1	**2**	Working of semiconductor diode in no bias, forward bias conditions & reverse bias condition	**6.**	Define depletion layer in a diode OR Discuss the formation of depletion layers in diodes.	2015-16, 2021-22
1	**2**	Working of semiconductor diode in no bias, forward bias conditions & reverse bias condition	**7.**	Explain the Knee voltage. What is the knee voltage for Ge, Si?	2017-18

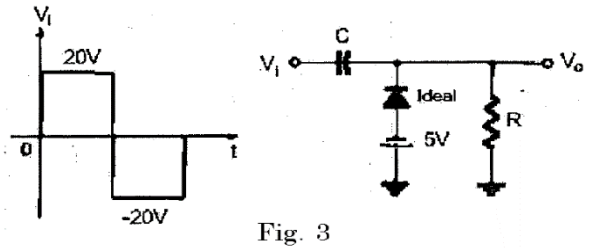
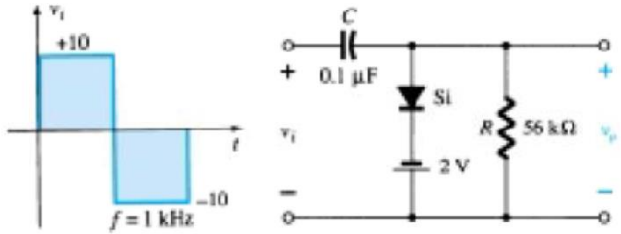
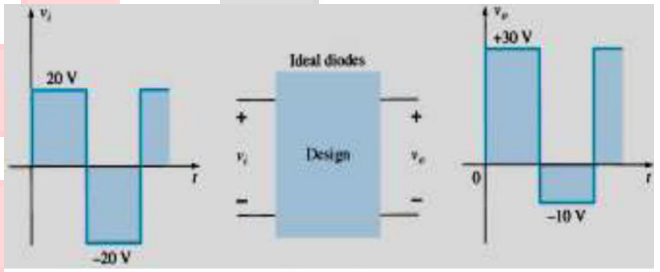
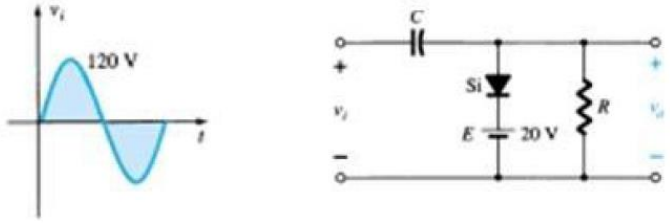
1	**3**	Explanation of diode equation, V/I characteristics of pn junction diode, Analysis of effect of temperature on different parameters of diode	**8.**	Draw & explain the V-I characteristic of a P-N junction diode. Also describe the effect of temperature on the V-I characteristic of a P-N junction diode. OR Draw the V-I characteristics of an ideal diode in forward and reverse bias conditions. OR Explain the working of the p-n junction diode and draw its V-I Characteristics. OR Effect of temperature on diodes.	2016-17, 2018-19, 2020-21, 2022-23, 2021-22
1	**4**	Problems based on diode equation and temperature effect, Illustration of ideal and simplified circuit representation of diode based on approximations	**9.**	The reverse saturation current of Si p-n junction diode is 10 uA at 300K. Determine the forward bias voltage to be applied to obtain diode current of 100 mA.	2017-18
1	**4**	Problems based on diode equation and temperature effect, Illustration of ideal and simplified circuit representation of diode based on approximations	**10.**	A Ge diode carries a current of 1 mA at room temperature when a forward bias of 0.15 V is applied. Estimate the reverse saturation current at room temperature.	2015-16
1	**4**	Problems based on diode equation and temperature effect, Illustration of ideal and simplified circuit representation of diode based on approximations	**11.**	Give all the equivalent/approximation circuits of a diode.	2016-17
1	**5**	Problems based on series & parallel circuits of diodes	**12.**	For the following circuit Determine $\mathbf{I_1}$, $\mathbf{I_2}$, and $\mathbf{I_{D2}}$ for the following figure. 	2016-17

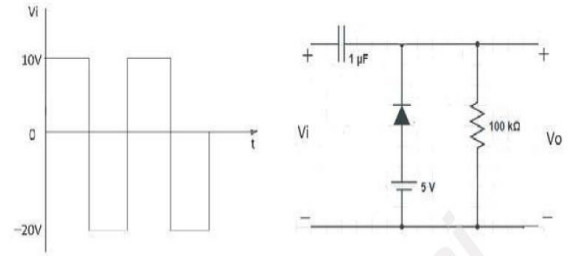
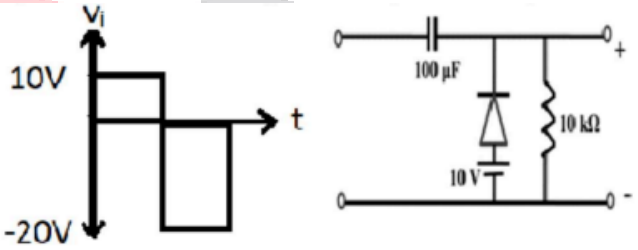
1	**5**	Problems based on series & parallel circuits of diodes	**13.**	Determine $\mathbf{V_o}$, $\mathbf{I_1}$, $\mathbf{I_{D1}}$and $\mathbf{I_{D2}}$ for the parallel diode configuration shown in fig 	2015-16
1	**6**	Explanation of two breakdown conditions under reverse bias conditions, Zener diode As Shunt voltage regulator	**14.**	Explain input and output characteristics of the Zener diode. OR Explain Zener diode as a voltage regulator.	2015-16, 2022-23
1	**6**	Explanation of two breakdown conditions under reverse bias conditions, Zener diode As Shunt voltage regulator	**15.**	Describe breakdown mechanism of diode.	2015-16
1	**6**	Explanation of two breakdown conditions under reverse bias conditions, Zener diode As Shunt voltage regulator	**16.**	How V-I characteristics of p-n junction diodes differ from Zener diodes?	2016-17
1	**6**	Explanation of two breakdown conditions under reverse bias conditions, Zener diode As Shunt voltage regulator	**17.**	Differentiate between avalanche and Zener breakdown. OR Compare between Avalanche breakdown and Zener breakdown. OR Differentiate between Avalanche and Zener breakdown.	2020-21, 2022-23, 2021-22
1	**7**	Problems based on voltage regulator	**18.**	Design a voltage regulator that maintains an output voltage of 20 V across a 1KΩ load with an input that will vary between 30V and 50V. That is, determine the proper value of $\mathbf{R_S}$and maximum current $\mathbf{I_{ZM}}$.	2014-15

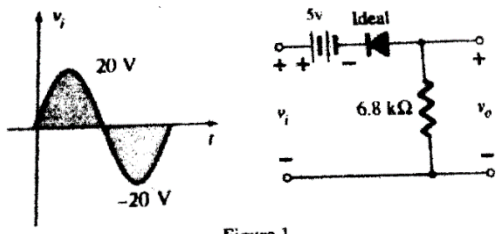
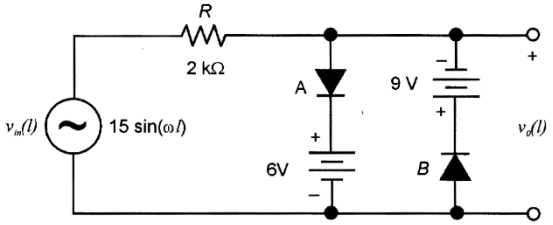
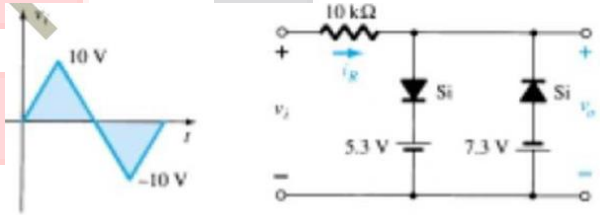
1	**7**	Problems based on voltage regulator	**19.**	For the network of Fig.2 determine the range of $\mathbf{V_i}$ that will maintain $\mathbf{V_L}$ at 8V and not exceed the maximum power rating of Zener diode.  Figure 2	2015-16
1	**7**	Problems based on voltage regulator	**20.**	Determine the range of $\mathbf{V_i}$ that for the Fig. that will maintain the Zener diode in ON state.  	2016-17
1	**7**	Problems based on voltage regulator	**21.**	For a Zener Voltage regulator, determine the range of $\mathbf{R_L}$ and $\mathbf{I_L}$that will result in V_o being maintained at 10V. Given $\mathbf{V_{in}}$ **= 50V**, R = 1K Ω, $\mathbf{I_{ZM}}$ =32mA.	2016-17 2017-18
1	**7**	Problems based on voltage regulator	**22.**	For the Zener voltage regulator, determine the range of $\mathbf{V_i}$ that will maintain the Zener diode in On state. Take R_L = 1.2 KΩ, R = 220 Ω, V_Z = 20 V, I_{ZM} = 60 mA.	2018-19
1	**7**	Problems based on voltage regulator	**23.**	Determine the range of input voltage Vi for the Zener diode to remain in the ON state shown in the following figure. Given that Vz =20 V, I zmax =50 mA, Rz= 0 ohm.  	2022-23

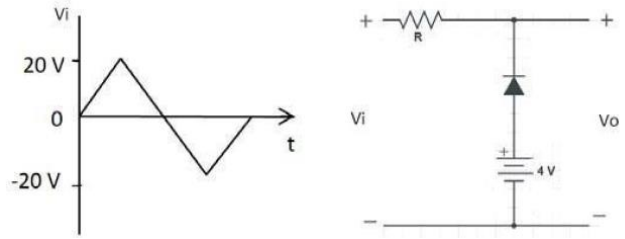
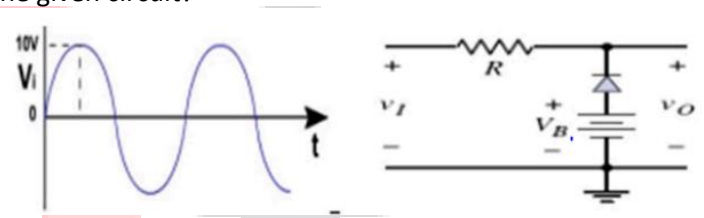
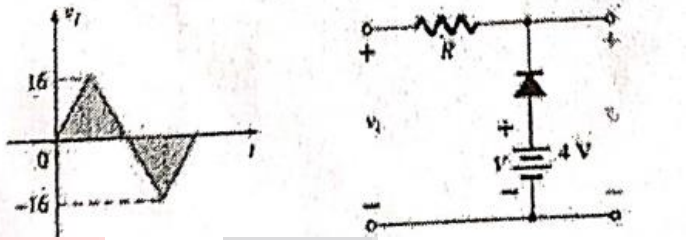
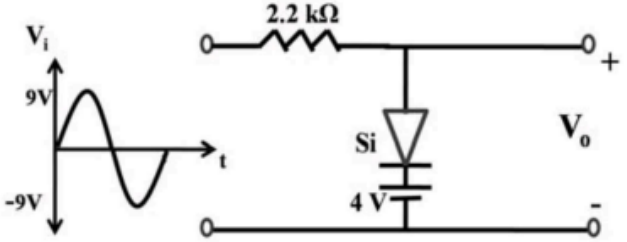
1	**7**	Problems based on voltage regulator	**24.**	Draw the V-I characteristics of Zener Diode. Determine the network of figures given below, determine the range of Vin that will maintain VL at 8V and not exceed the maximum power rating .  	2021-22
1	**8**	Working of Half wave and Full wave rectifiers	**25.**	Draw and explain the working of bridge rectifiers with input and output waveforms. Calculate efficiency and ripple factor. OR Draw a neat circuit diagram of the bridge rectifier and explain its operation with output waveforms. Drive the average value of current and voltage OR Draw the circuit and discuss the working of full wave bridge rectifiers with suitable input -output waveforms. What is the PIV of the bridge rectifier?	2014-15, 2022-23, 2016-17, 2017-18, 2020-21
1	**8**	Working of Half wave and Full wave rectifiers	**26.**	Differentiate between half wave and full wave rectifier.	2015-16
1	**8**	Working of Half wave and Full wave rectifiers	**27.**	Draw and explain the working of Centre Tapped Full wave rectifiers. Also Calculate its efficiency and ripple factor.	2022-23
1	**8**	Working of Half wave and Full wave rectifiers	**28.**	Why bridge type full wave rectifier is preferred over center tapped full wave rectifier. State two reasons.	2020-21
1	**9**	Different parameters of rectifiers and comparison between rectifiers on basis of these parameters	**29.**	For a half wave rectifier derive an expression for the ripple factor.	2015-16
1	**9**	Different parameters of rectifiers and comparison between rectifiers on basis of these parameters	**30.**	Define the term ripple factor. What is the value of the ripple factor for a half wave rectifier and a full wave rectifier?	2020-21

1	**10**	Numerical based on rectifiers	**31.**	Determine $\mathbf{V_o}$ and required PIV rating of each diode for the configuration of Fig. 2.  Fig.2	2014-15
1	**10**	Numerical based on rectifiers	**32.**	Sketch $\mathbf{V_o}$ for the network of Fig. 3 and determine the peak inverse voltage of each diode.	2015-16
1	**10**	Numerical based on rectifiers	**33.**	In a full wave rectifier, the load resistance is 2 K Ω, rf = 400 Ω. Voltage applied to each diode is 240Sinωt. Find (i) Peak value of current i.e. **Im** (ii) DC value of current i.e $\mathbf{I_{dc}}$ (iii) RMS value of current i.e. **Irms** (iv) Efficiency (v) Ripple Factor.	2016-17
1	**10**	Numerical based on rectifiers	**34.**	Determine the output waveform for the given network below. Also determine the output dc level and compute PIV of each diode.  	2017-18
1	**10**	Numerical based on rectifiers	**35.**	In the bridge rectifier circuit the secondary voltage Vs= 100 sin50t and load resistance is 1K Ohm. Calculate a. DC current, b. RMS current, c. Efficiency and d. Ripple factor.	2021-22
1	**11**	Different types of clampers and steps to draw their waveforms, Problems based on clampers	**36.**	Differentiate between Clipper and Clamper circuit.	2016-17, 2018-19

1	**11**	Different types of clampers and steps to draw their waveforms, Problems based on clampers	**37.**	Sketch $\mathbf{V_o}$ for the given network shown in Fig. 3 for the input shown.  Fig. 3	2014-15
1	**11**	Different types of clampers and steps to draw their waveforms, Problems based on clampers	**38.**	Determine $\mathbf{V_o}$for the following figure  	2016-17
1	**11**	Different types of clampers and steps to draw their waveforms, Problems based on clampers	**39.**	Design a clamper to perform the function indicated in Figure 3.  Figure 3	2017-18
1	**11**	Different types of clampers and steps to draw their waveforms, Problems based on clampers	**40.**	Sketch the output for the given clamper circuit with shown in figure below.  	2018-19

1	**11**	Different types of clampers and steps to draw their waveforms, Problems based on clampers	**41.**	Determine the output waveform of the following circuit, by presenting all the necessary calculations which have been done to determine this output. 	2020-21
1	**11**	Different types of clampers and steps to draw their waveforms, Problems based on clampers	**42.**	Define Clamper .Determine output voltage for the given feedback. 	2021-22
1	**12**	Voltage multiplier	**43.**	With the help of necessary diagrams differentiate between half wave and full wave doubler.	2014-15
1	**12**	Voltage multiplier	**44.**	Describe with the help of circuit diagram working of voltage tripler circuit. OR Draw the circuit diagram of the voltage tripler circuit?	2015-16, 2022-23
1	**12**	Voltage multiplier	**45.**	Describe the working of voltage multiplier circuits. OR Define the Voltage Multiplier. Draw the circuit and explain the working of voltage tripler and Quadrupler circuit.	2017-18, 2021-22
1	**12**	Voltage multiplier	**46.**	With help of a neat diagram, explain the working of a voltage doubler circuit.	2016-17, 2020-21

1	**13**	Clippers: Introduction, types and problems	**47.**	Determine and sketch $\mathbf{V_o}$ for the given network shown in Fig. 1.  Figure 1	2014-15
1	**13**	Clippers: Introduction, types and problems	**48.**	Explain the function of the circuit of Fig. 2 and draw the output waveform.  Fig-2.	2015-16, 2016-17
1	**13**	Clippers: Introduction, types and problems	**49.**	Define clipper circuit. Sketch the output for the circuit given below for the given input.  	2017-18

1	**13**	Clippers: Introduction, types and problems	**50.**	Determine the output waveform of the following circuit 	2020-21
1	**13**	Clippers: Introduction, types and problems	**51.**	What do you mean by clipper? Draw the output waveform of the given circuit? 	2021-22
1	**13**	Clippers: Introduction, types and problems	**52.**	Determine and draw the output voltage given network. 	2022-23
1	**13**	Clippers: Introduction, types and problems	**53.**	Determine and draw output voltage for a given network. 	2021-22

1	**14**	Special Purpose diodes	**54.**	Explain working and characteristics of the Tunnel diode with the help of a neat diagram.	2015-16, 2016-17, 2017-18
1	**14**	Special Purpose diodes	**55.**	What is a Varactor diode, give applications also? OR Why the Varactor diode is also called Varicap? Explain. OR What do you mean by a varactor diode? Write one application.	2015-16, 2016-17, 2020-21, 2022-23
1	**14**	Special Purpose diodes	**56.**	Explain the principle of operation of LED.	2016-17, 2017-18
1	**14**	Special Purpose diodes	**57.**	Explain the working of the following with the help of a suitable diagram. (i) LED (ii) Photodiode	2022-23
2	**15**	Illustration of meaning of word transistor, its classification, introduction of structure of BJT, Explanation of current flow in BJT, Conditions for different regions of operation and their uses	**1.**	Describe the construction of n p n BJT?	2020-21
2	**15**	Illustration of meaning of word transistor, its classification, introduction of structure of BJT, Explanation of current flow in BJT, Conditions for different regions of operation and their uses	**2.**	Explain why BJT is a Bipolar Device?	2015-16
2	**15**	Illustration of meaning of word transistor, its classification, introduction of structure of BJT, Explanation of current flow in BJT, Conditions for different regions of operation and their uses	**3.**	Discuss Doping profile and physical appearance of Emitter, base and collector of a transistor?	2013-14
2	**15**	Illustration of meaning of word transistor, its classification, introduction of structure of BJT, Explanation of current flow in BJT, Conditions for different regions of operation and their uses	**4.**	Thickness of the base is typically smaller than the emitter and collector. Why?	2011-12

2	**16**	Introduction of CB Configurations of BJT: Structure, Current gain, Input Characteristics, Output Characteristics	**5.**	Draw the I/P and O/P characteristics of Common Base Configuration? OR Draw the circuit of the NPN transistor in common base configuration and discuss its working. Draw input-output characteristics. OR Draw and explain common base N P N transistors with the input and output characteristics graph. Also write an expression for output current.	2015-16, 2011-12, 2022-23, 2021-22
2	**17**	Output Characteristics of CB configuration (Contd.), CE configuration: Structure, Current gain, Input characteristics			
2	**18**	Output characteristics of CE Configuration, Comparison between different configurations of BJT on the basis of different parameters, Numerical based on BJT	**6.**	Draw the I/P and O/P characteristics of Common Emitter Configuration? OR Draw and explain the working of N P N transistors in common Emitter configuration with its suitable characteristics graph. OR Describe the construction and working of a NPN transistor in CE configuration w.r.t to size and doping. Also draw the input and output characteristics graph.	2020-21, 2015-16, 2011-12, 2010-11, 2022-23, 2021-22
2	**18**	Output characteristics of CE Configuration, Comparison between different configurations of BJT on the basis of different parameters, Numerical based on BJT	**7.**	What is Base Width Modulation? How does it affect the characteristics of CB and CE configuration?	2011-12
2	**18**	Output characteristics of CE Configuration, Comparison between different configurations of BJT on the basis of different parameters, Numerical based on BJT	**8.**	Explain the Common Collector Configuration in case of n p n Transistor?	2015-16
2	**18**	Output characteristics of CE Configuration, Comparison between different configurations of BJT on the basis of different parameters, Numerical based on BJT	**9.**	How can a transistor be defined as a Current operated Device?	2013-14

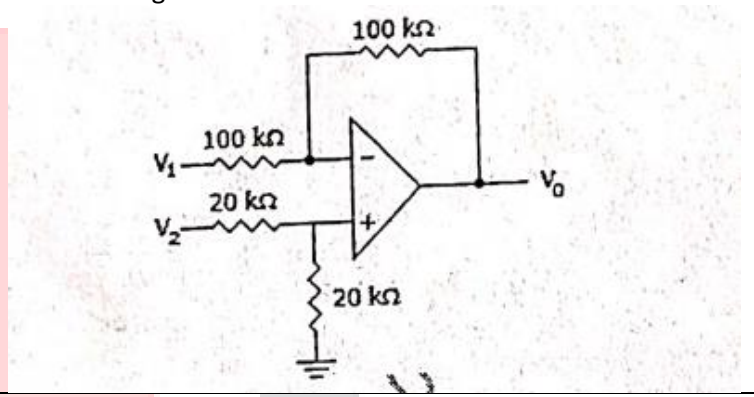
2	**18**	Output characteristics of CE Configuration, Comparison between different configurations of BJT on the basis of different parameters, Numerical based on BJT	**10.**	Derive the relationship $I_C = \beta I_b + I_{cbo}$?	2013-14
2	**18**	Output characteristics of CE Configuration, Comparison between different configurations of BJT on the basis of different parameters, Numerical based on BJT	**11.**	A transistor having $\alpha = 0.975$ and $I_{co} = 10\mu A$ is operated in CE mode. What is β for this configuration? If the I_b is 250μA then calculate I_e and I_c?	2013-14
2	**18**	Output characteristics of CE Configuration, Comparison between different configurations of BJT on the basis of different parameters, Numerical based on BJT	**12.**	A n p n transistor having $\alpha = 0.98$ and $I_{co} = 10\mu A$ is operated in CB mode. If the Ie is 3 mA then calculate I_b and I_c?	2010-11
2	**18**	Output characteristics of CE Configuration, Comparison between different configurations of BJT on the basis of different parameters, Numerical based on BJT	**13.**	The α and β of a transistor are 0.99 and 99 .If its I_{cbo} is 0.1A then I_{ceo} is _____?	2009-10
2	**18**	Output characteristics of CE Configuration, Comparison between different configurations of BJT on the basis of different parameters, Numerical based on BJT	**14.**	Derive the relationship between α and β? OR Derive relation between current gain CB and CE configuration of Transistor.	2011-12, 2022-23
2	**18**	Output characteristics of CE Configuration, Comparison between different configurations of BJT on the basis of different parameters, Numerical based on BJT	**15.**	Determine Ie ,α and β of CB transistors when Ic= 7ma, Ib=0.1 mA?	2011-12
2	**18**	Output characteristics of CE Configuration, Comparison between different configurations of BJT on the basis of different parameters, Numerical based on BJT	**16.**	For a transistor IE = 10 mA and α = 0.987. Find IC and IB	2022-23
2	**18**	Output characteristics of CE Configuration, Comparison between different configurations of BJT on the basis of different parameters, Numerical based on BJT	**17.**	Determine β , if IE =5 mA, IC = 4.95 mA.	2021-22

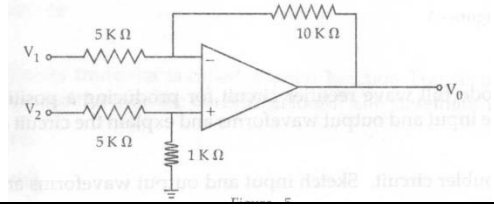
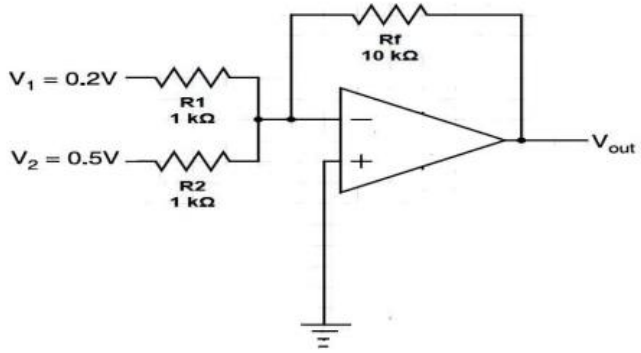
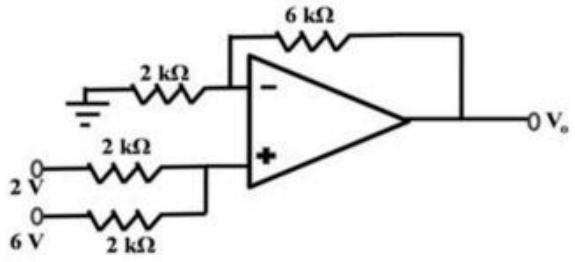
2	**18**	Output characteristics of CE Configuration, Comparison between different configurations of BJT on the basis of different parameters, Numerical based on BJT	**18.**	Determine βac and Icbo , if IE =6mA ,IC = 5.92 mA and ICBO=200 mA.	2021-22
2	**18**	Output characteristics of CE Configuration, Comparison between different configurations of BJT on the basis of different parameters, Numerical based on BJT	**19.**	Define α and β wrt to BJT and derive the relationship between them . A transistor having α = 0.975 and reverse saturation current ICBO= 10 uA is operated in CE mode. If the base current is 250 uA. Calculate IE and IC.	2021-22
2	**19**	Introduction of FET, Classification of FET, Introduction of JFET, Output & transfer characteristics of n channel JFET.	**20.**	How does the electric field in FET control a drain Current?	2013-14
2	**19**	Introduction of FET, Classification of FET, Introduction of JFET, Output & transfer characteristics of n channel JFET.	**21.**	What is Pinch off Condition in FET?	2011-12
2	**19**	Introduction of FET, Classification of FET, Introduction of JFET, Output & transfer characteristics of n channel JFET.	**22.**	Explain Ohmic region of JFET?	2015-16
2	**19**	Introduction of FET, Classification of FET, Introduction of JFET, Output & transfer characteristics of n channel JFET.	**23.**	Explain the working of N channel JFET?	2009-10
2	**19**	Introduction of FET, Classification of FET, Introduction of JFET, Output & transfer characteristics of n channel JFET.	**24.**	Explain the Construction and characteristics of JFET?	2008-09
2	**19**	Introduction of FET, Classification of FET, Introduction of JFET, Output & transfer characteristics of n channel JFET.	**25.**	Explain why FET is a Voltage Variable resistor?	2015-16, 2014-15
2	**19**	Introduction of FET, Classification of FET, Introduction of JFET, Output & transfer characteristics of n channel JFET.	**26.**	Explain the Transconductance curve of JFET? OR Define transconductance of JFET?	2015-16, 2021-22
2	**19**	Introduction of FET, Classification of FET, Introduction of JFET, Output & transfer characteristics of n channel JFET.	**27.**	In JFET Idss=6mA, Vp=-3V biased at Vgs= -2 . Determine the value of transconductance? OR In JFET Idss=8mA, Vp=-4V biased at Vgs= -1.8V. Determine the value of transconductance?	2015-16

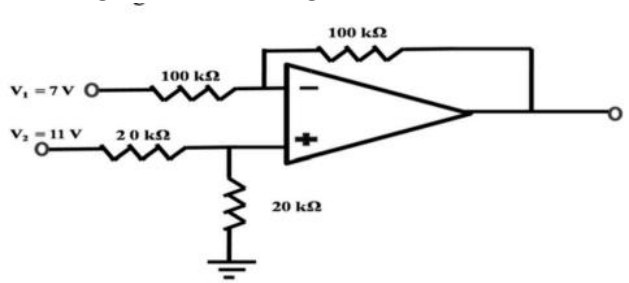
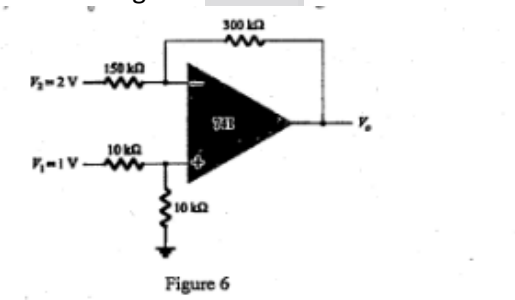
2	**19**	Introduction of FET, Classification of FET, Introduction of JFET, Output & transfer characteristics of n channel JFET.	**28.**	Define Ohmic Region, gate cut-off voltage and transconductance in JFET?	2012-13
2	**19**	Introduction of FET, Classification of FET, Introduction of JFET, Output & transfer characteristics of n channel JFET.	**29.**	Given Idss= 9mA and Vp=-3.5V determine Id when Vgs=0V and Vgs=-2V?	2011-12
2	**19**	Introduction of FET, Classification of FET, Introduction of JFET, Output & transfer characteristics of n channel JFET.	**30.**	In JFET Idss=6mA, Vp=-4.5V biased at Vgs= -1.8V. Determine Id at Vgs=-2V and -3.6 V?	2011-12
2	**19**	Introduction of FET, Classification of FET, Introduction of JFET, Output & transfer characteristics of n channel JFET.	**31.**	Why is a JFET called a Voltage Controlled device? Draw its structure and O/P characteristics of P channel JFET indicate different regions and its significance? OR Why FET is a voltage controlled device?	2010-11, 2022-23
2	**19**	Introduction of FET, Classification of FET, Introduction of JFET, Output & transfer characteristics of n channel JFET.	**32.**	Define: Idss , Pinch off Voltage, Voltage controlled resistance of JFET? OR Define Pinch-off voltage for JFET	2009-10, 2022-23
2	**20**	Use of JFET as VVR, Different parameters of JFET. Introduction of DMOSFET, Output and Transfer characteristic of DMOSFET	**33.**	Explain the Characteristics, Working and Construction of n Channel Depletion type Mosfet? OR Explain the working principle of Depletion type MOSFET (n-channel). Draw & Explain its characteristics. OR Explain the construction, working and characteristics of N channel Depletion MOSFET. OR Draw the structure of Depletion Type N-MOSFET. Explain its operation with a characteristic graph.	2020-21, 2015-16, 2014-15, 2013-14, 2011-12, 2022-23, 2021-22
2	**20**	Use of JFET as VVR, Different parameters of JFET. Introduction of DMOSFET, Output and Transfer characteristic of DMOSFET	**34.**	Explain the working operation of Enhancement and Depletion mode mosfet? And derive the expression of transconductance?	2020-21, 2015-16, 2013-14, 2012-13, 2011-12, 2009-10

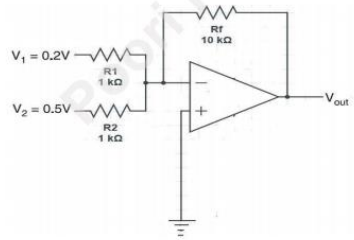
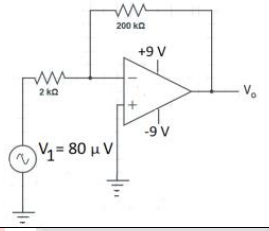
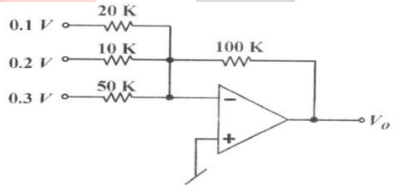
2	**20**	Use of JFET as VVR, Different parameters of JFET. Introduction of DMOSFET, Output and Transfer characteristic of DMOSFET	**35.**	Explain the Characteristics, Working and Construction of p Channel Depletion type MOSFET? OR Describe the construction and working of P channel Depletion MOSFET with characteristics graph. Also justify that it is a voltage controlled device.	2009-10, 2021-22
2	**20**	Use of JFET as VVR, Different parameters of JFET. Introduction of DMOSFET, Output and Transfer characteristic of DMOSFET	**36.**	Explain the construction, working and characteristics of MOSFET?	2008-09
2	**21**	Introduction of EMOSFET and its output and transfer characteristic), Comparison between BJT & FET & Comparison between JFET, DMOSFET & EMOSFET.	**37.**	Explain the Characteristics, Working and Construction of P channel Enhancement type Mosfet? OR Explain the construction, working and characteristics of N channel Enhancement MOSFET. OR Explain the working of E-MOSFET along with their transfer characteristics.	2015-16, 2014-15, 2022-23, 2021-22
2	**21**	Introduction of EMOSFET and its output and transfer characteristic), Comparison between BJT & FET & Comparison between JFET, DMOSFET & EMOSFET.	**38.**	List the Differences between JFET and BJT? OR Differentiate between BJT and JFET. OR What is the difference between BJT and JFET.	2020-21, 2012-13, 2008-09, 2021-22
2	**21**	Introduction of EMOSFET and its output and transfer characteristic), Comparison between BJT & FET & Comparison between JFET, DMOSFET & EMOSFET.	**39.**	Explain Why BJT's are called Bipolar and FET's are Unipolar?	2011-12, 2009-10
2	**21**	Introduction of EMOSFET and its output and transfer characteristic), Comparison between BJT & FET & Comparison between JFET, DMOSFET & EMOSFET.	**40.**	What are the advantages of FET over BJT? Define Pinch off Voltage and Drain Resistance of FET?	2011-12
2	**21**	Introduction of EMOSFET and its output and transfer characteristic), Comparison between BJT & FET & Comparison between JFET, DMOSFET & EMOSFET.	**41.**	List the differences between JFET and MOSFET?	2011-12

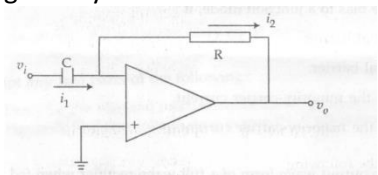
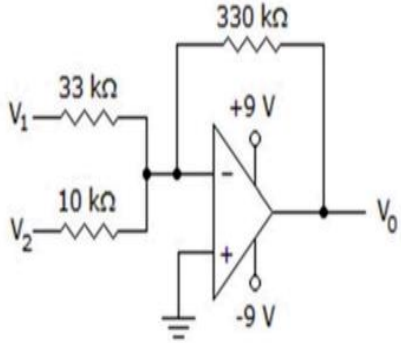
3	**22**	Introduction of Op Amp: Block diagram, Differential and common mode operation	**1.**	What is an operational amplifier? Draw its block diagram. Write the characteristics of an ideal operational amplifier. OR Draw the block diagram of Op-Amp and list all the ideal characteristics of opamp. OR Write down the characteristics of ideal OP AMP?	2020-21 2019-20, 2022-23
3	**22**	Introduction of Op Amp: Block diagram, Differential and common mode operation	**2.**	Define the following terms: (1) CMRR (2) Peak Inverse Voltage OR Define CMRR and Slew rate of Op-Amp OR The output of a particular OP AMP increases 8 V in 12 usec. What is the Slew rate? OR What do you mean by CMRR? OR What do you mean by CMRR in OPAMP?	2020-21, 2022-23, 2021-22
3	**23**	Ideal and practical parameters of op amp	**3.**	Enlist the Characteristics of an ideal op amp. OR Enlist the characteristics of an ideal OP AMP OR Write down the characteristics of ideal OP AMP.	2009-10, 2013-14, 2021-22
3	**24**	Non-inverting and inverting OP AMP, OP AMP as an adder, subtractor	**4.**	What is an op amp? How is it used as an integrator and summer? OR With the help of the circuit diagram, explain the working of OP AMP as an Integrator. OR With the help of the circuit diagram, explain the working OPAMP as a non inverting summer. OR Briefly explain: 1. OP AMP as Non- inverting amplifier 2. Inverting summer.	2009-10, 2022-23, 2021-22

3	**24**	Non-inverting and inverting OP AMP, OP AMP as an adder, subtractor	**5.**	Write short note on Non Inverting Amplifier OR Derive the expression for gain of OP AMP as Non Inverting Amplifier.	2013-14 2014-15, 2021-22
3	**24**	Non-inverting and inverting OP AMP, OP AMP as an adder, subtractor	**6.**	Draw the circuit diagram for unity gain amplifiers. Where is it used and why? OR Explain Voltage Follower circuit using OP AMP. OR Explain unity gain amplifier. Determine the output voltage of the following network. 	2009-10, 2022-23
3	**24**	Non-inverting and inverting OP AMP, OP AMP as an adder, subtractor	**7.**	Draw the subtractor using op-amp and explain its working OR Draw the circuit of the subtractor using op Amp and explain its working. Also obtain expression for its output	2013-14, 2019-20 2014-15
3	**25**	Integrator & differentiator, Comparator	**8.**	With help of the circuit diagram, explain the working of OPAMP as differentiator	2020-21, 2019-20
3	**25**	Integrator & differentiator, Comparator	**9.**	Draw the circuit of the integrator using op Amp and explain its working. Also obtain expression for its output OR Explain the working of op-amp as a Integrator and drive its output equation OR Draw and explain the working of Integrator and differentiator using OP-AMP.	2019-20 2017-18, 2022-23, 2021-22

3	**26**	Numerical Problems based upon Op-Amps	**10.**	Find the output voltage of the following op-amp circuit shown in the Fig below 	2009-10
3	**26**	Numerical Problems based upon Op-Amps	**11.**	An ideal operational amplifier is used to make an inverting amplifier. There are two input terminals of the operational amplifier and are at the same potential because: (a) The two inputs are directly short circuited internally (a) The resistance of operational amplifier is infinity (b) The open loop gain of the operational amplifier is unity (c) All the above except option (a)	2009-10
3	**26**	Numerical Problems based upon Op-Amps	**12.**	Calculate the output voltage Vo of the circuit shown in fig 1. 	2022-23
3	**26**	Numerical Problems based upon Op-Amps	**13.**	Explain the virtual ground concept in OP AMP .Determine output voltage for given network. 	2021-22

3	**26**	Numerical Problems based upon Op-Amps	**14.**	Enlist the ideal characteristics of OPAMP. Also determine the output voltage of the following circuit.  	2021-22
3	**27**	Numerical Problems based upon Op-Amps	**15.**	The output voltage in op amp differentiator with input voltage Vi the output voltage is given by ……..when R=1k and C=1pf	2010-11
3	**27**	Numerical Problems based upon Op-Amps	**16.**	A sinusoidal signal with peak value 6 mV and 2 KHz frequency is applied to the input of an ideal OP-AMP Integrator with R_{in} = 100K ohm and C_f = 1µF. Find the output voltage	2010-11
3	**27**	Numerical Problems based upon Op-Amps	**17.**	(i) Determine the output voltage of an op-amp for input voltages of Vi_1= 100V and Vi_2 = 120V. The amplifier has a differential gain of A_d= 4000 and the value of CMRR is: (a) 150 (b) 10^3 (ii) Find V_o for the circuit shown belown in Figure6  Figure 6	2015-16

3	**27**	Numerical Problems based upon Op-Amps	**18.**	Determine the output for the following circuits : (i)  (ii)  	2020-21
3	**27**	Numerical Problems based upon Op-Amps	**19.**	Draw the op-amp based circuit to give: Vo= V1 + V2 + V3	2009-10
3	**27**	Numerical Problems based upon Op-Amps	**20.**	Determine the Vo for the following circuit  	2009-10

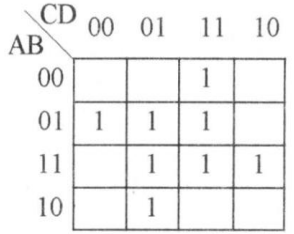
3	**27**	Numerical Problems based upon Op-Amps	**21.**	For the circuit shown in the Fig . The output voltage V_o is given by  Figure - 1 (i) $v_0 = -\frac{1}{RC}\frac{dv_i(t)}{dt}$ (ii) $v_0 = -\frac{1}{RC}\int_0^t v_i(t)\,dt$ (iii) $v_0 = -RC\frac{dv_i(t)}{dt}$ (iv) $v_0 = -RC\int_0^t v_i(t)\,dt$	2009-10
3	**27**	Numerical Problems based upon Op-Amps	**22.**	a. Determine the output voltage of an OPAMP for the input of V1=150 uV and V2= 140 uV. The amplifier has a differential gain Ad= 4000 and CMRR=100. b. Determine the output voltage of the following circuit. V1=V2=0.15V. 	2021-22
4	**28**	Introduction of Number system and conversion among them	**1.**	Convert them to its equivalent in Base-2, Base-8 and base-16 (ii) Perform M-N and M+N if M=10101 and N=1111	2008-09
4	**28**	Introduction of Number system and conversion among them	**2.**	Convert FEDA(hex) into decimal 7650 octal into hex 11010110 binary into octal	2009-10

4	**28**	Introduction of Number system and conversion among them	**3.**	Convert the following : $(2CCD)_{16} = ( )_8 = ( )_5$ $(784)_9 = ( )_{10} = ( )_4 = ( )_2$	2009-10
4	**28**	Introduction of Number system and conversion among them	**4.**	Add and subtract without converting the following octal numbers 7461 and 3465.	2009-10
4	**28**	Introduction of Number system and conversion among them	**5.**	Convert the following numbers as indicated $(62.7)_8 = ( )_{16}$ $(BC64)_{16} = ( )_{10}$ $(111011)_2 = ( )_5$	2009-10
4	**28**	Introduction of Number system and conversion among them	**6.**	$(CA95.12)_{16} - (9FE.A)_{16} =$ _____	2010-11
4	**28**	Introduction of Number system and conversion among them	**7.**	Convert decimal number 225 to binary, octal and hexadecimal. Add octal numbers 362 and 215.	2011-12
4	**28**	Introduction of Number system and conversion among them	**8.**	Convert the following $(389)_{10} =( )_6$ $(FB27)_{16} = ( )_8$ $(11001101)_2 =( )_{10}$	2011-12
4	**28**	Introduction of Number system and conversion among them	**9.**	Subtract by using r's complement method where r is the base of the number: $(3762)_2$ and $(2664)_2$ $(11.0101)_2$ and $(11.100)_2$	2011-12
4	**28**	Introduction of Number system and conversion among them	**10.**	Evaluate: $(637)_9 = (?)_5$	2020-21
4	**28**	Introduction of Number system and conversion among them	**11.**	Find 1's and 2's complement of : 1101001	2020-21
4	**28**	Introduction of Number system and conversion among them	**12.**	Convert the following: i) (53.625)10 to (?)2 ii) Find the base x if (211)x = (152)8 iii) Subtract using 1's complement: (10111)2 – (110011)2 iv) find the 1's and 2's complement of (010100)2	2022-23
4	**28**	Introduction of Number system and conversion among them	**13.**	Determine the base of the following 1. (345)10= (531)x 2. (2374)16=(9076)x	2021-22
4	**28**	Introduction of Number system and conversion among them	**14.**	Perform the following operation as indicated. i. Determine 2's complement of (1010.110)2. ii. Convert (25.125)10 into hexadecimal numbers. iii. Add binary number (1011)2 and (1111)2. iv. State De Morgan's law. v. Define minterm and maxterm.	2021-22

4	**29**	Introduction Of Boolean Algebra, different laws and their use in function Boolean minimization	**15.**	A.(A'+B)=?	2009-10
4	**29**	Introduction Of Boolean Algebra, different laws and their use in function Boolean minimization	**16.**	Express the Boolean function F=xy+z in a product of maxterm form.	2009-10
4	**29**	Introduction Of Boolean Algebra, different laws and their use in function Boolean minimization	**17.**	Simplify the following function by using the Boolean algebra (i) AB'C'D + A'B'D + BCD'+ A'B+BC'	2010-11
4	**29**	Introduction Of Boolean Algebra, different laws and their use in function Boolean minimization	**18.**	A'B'C' + A'B'C +A'BC' +ABC' = _____	2010-11
4	**29**	Introduction Of Boolean Algebra, different laws and their use in function Boolean minimization	**19.**	Simplify the following logic expression using Boolean Algebra (i) F= AB+ A(B+C) +B(B+C) (II) F= AB'C'D +A'B'D+BCD'+A'B+BC'	2010-11
4	**29**	Introduction Of Boolean Algebra, different laws and their use in function Boolean minimization	**20.**	Write and explain the postulates of Boolean algebra. OR Discuss the commutative and distributive postulates of Boolean algebra with example. OR Discuss the postulates of Boolean algebra. How is it different from ordinary algebra?	2011-12 2011-12 2008-09
4	**29**	Introduction Of Boolean Algebra, different laws and their use in function Boolean minimization	**21.**	State DeMorgan's Theorem.	2013-14
4	**29**	Introduction Of Boolean Algebra, different laws and their use in function Boolean minimization	**22.**	Simplify (A + B + C) (A +B'+C') (A + B+C')(A + B'+ C) using Boolean algebra.	2013-14

4	**30**	Introduction of Logic gates, Universal Gates, Realization of basic gates using universal gates	**23.**	What are universal gates? Implement the expression of XOR gate with the help of NAND gates only. OR Draw the circuit of a 2 input EX-OR gate using 2 input NAND gates OR What are universal gates? Justify your answer. OR What is the universal gate? Name the universal gate? Give the proof of universal gate at least for one type of gate OR What are universal gates? Why are they called so? OR Draw the logic diagram of Ex-OR gate using Universal gate (NAND and NOR). OR Design a two input EX-OR gate using a minimum number of (i) NAND gates only and (ii) NOR gates only. OR (i) What are universal gates? Why are they called so? (ii)Implement XOR gate using NAND gate OR Define universal logic gates. Realize basic logic gates using NAND and NOR gates.	2008-09 2009-10 2009-10 2010-11 2011-12 2011-12 2013-14 2020-21 2021-22
4	**30**	Introduction of Logic gates, Universal Gates, Realization of basic gates using universal gates	**24.**	Realize the following expression using Ex-OR/Ex-NOR gates and basic gates if required F(A,B,C,D) = A'BC'+ A'B'C + AC'D + ACD'	2009-10
4	**30**	Introduction of Logic gates, Universal Gates, Realization of basic gates using universal gates	**25.**	Implement an OR gate using NAND gates.	2011-12
4	**30**	Introduction of Logic gates, Universal Gates, Realization of basic gates using universal gates	**26.**	Design a circuit using only NOR gates for Boolean expression Y=ABC'+ BCD'+CD	2011-12
4	**30**	Introduction of Logic gates, Universal Gates, Realization of basic gates using universal gates	**27.**	Define Universal Gates. Implement AND, OR, NOR by using NAND gates only.	2022-23
4	**30**	Introduction of Logic gates, Universal Gates, Realization of basic gates using universal gates	**28.**	Write the truth table of two input XOR gate and two input XNOR gate.	2021-22

4	**31**	SOP and POS and Canonical form representation	**29.**	Given the Boolean function : F(A,B,C,D) = A'B'C' + AC'D' + AB' + ABCD' + A'B'C (i) Express it in sum of minterms. (ii) Find the minimal sum of products expression using K-map and implement the output using NAND gates only	2009-10
4	**31**	SOP and POS and Canonical form representation	**30.**	Convert the given expression into canonical SOP form: f= A+ AB+ABC	2010-11
4	**31**	SOP and POS and Canonical form representation	**31.**	Convert the given expression into canonical POS form: F= (A+B)(B+C)+(C+A)	2010-11
4	**31**	SOP and POS and Canonical form representation	**32.**	What do you mean by the canonical form of a Boolean expression?	2011-12
4	**31**	SOP and POS and Canonical form representation	**33.**	Simplify the given boolean function F together with don't care conditions in POS: F(w,x,y,z)= Sum(0,1,2,3,7,8,10) d(w,x,y,z)= π(5,6,11,15)	2011-12
4	**31**	SOP and POS and Canonical form representation	**34.**	Convert F = X + YZ to canonical SOP.	2013-14
4	**31**	SOP and POS and Canonical form representation	**35.**	What are MAXTERM and MINTERM?	2011-12
4	**31**	SOP and POS and Canonical form representation	**36.**	Convert the following into POS format: Y(A,B,C,D)= (A+B+C).(A+D)	2011-12
4	**31**	SOP and POS and Canonical form representation	**37.**	By showing all the calculations, do as directed: (i) For a boolean function of 4 variables, ∑(3,7,11,14,15) = Π(?)	2020-21
4	**32**	Introduction of K Map: 2&3 Variable	**38.**	Simplify the boolean function F in sum of products using don't care conditions d (using K-map) (i) F= Y' + X'Z' d= YZ +XY	2008-09
4	**32**	Introduction of K Map: 2&3 Variable	**39.**	What do you understand by don't care conditions? Is it an advantage or disadvantage to include them in a map? Explain with reason.	2009-10
4	**33**	K map: Don't care condition, 4 Variable	**40.**	Simplify the boolean function F in sum of products using don't care conditions d (using K-map) F= B'C'D' + BCD' + ABCD' d= B'CD' + A'BC'D	2008-09

4	**33**	K map: Don't care condition, 4 Variable	**41.**	Minimise the following K-Map :  	2009-10
4	**33**	K map: Don't care condition, 4 Variable	**42.**	Minimize the given function using K-map and convert the minimized function into POS form F (A,B,C,D) = sum (1,3,5,7,9,10,12,13)	2009-10
4	**33**	K map: Don't care condition, 4 Variable	**43.**	Simplify the following function with the help of K map: F(A,B,C,D)= sum(3,5,9,11,15)+d(2,4,6,10)	2011-12
4	**33**	K map: Don't care condition, 4 Variable	**44.**	Minimize the following using K-map technique: F(A,B,C,D)= AB'C' +A'BC + A'B'CD +ABCD + d(1,5)	2011-12
4	**33**	K map: Don't care condition, 4 Variable	**45.**	Simplify the following function using k map: F(A,B,C,D)= sum(1,3,4,6,8,9,11,13,15)+ d(0,2,14)	2010-11
4	**33**	K map: Don't care condition, 4 Variable	**46.**	Simplify the following expression using K-Map and realize using NOR gates only. F(A, B, C, D) = A' B' C' + AC'D' + AB'+ A B C D' + A'B'C	2013-14
4	**33**	K map: Don't care condition, 4 Variable	**47.**	Simplify the following function using K map F(A, B, C, D) = ∑(1, 3, 4, 5, 6, 7, 9, 11, 13, 15) Also implement the simplified function using basic gates only.	2020-21
4	**33**	K map: Don't care condition, 4 Variable	**48.**	Minimize using K-map and realize using NOR gates only. F (A, B, C, D) = π M(3,4,5,7,9,13,14,15), d(0,2,8)	
4	**33**	K map: Don't care condition, 4 Variable	**49.**	Minimize using K-map and realize output using gates. F (A, B, C, D) = Σ m (1, 4, 8, 12, 13,15) + d (3, 14)	2022-23
4	**33**	K map: Don't care condition, 4 Variable	**50.**	Simplify the following boolean expression using K-Map and implement the simplified expression using NOR GATEs only. F (A, B, C, D) = π M(1,3,4,5,6,7,11,12,14,15)	2022-23
4	**33**	K map: Don't care condition, 4 Variable	**51.**	Simplify the function F(A,B,C,D) = Σ m(0,2,5,6,7,13,14,15)+ d(8,10) using K map and implementing the simplified function using NAND gates only.	2021-22

4	**34**	K Map: 5 & 6 Variable K map, Numerical on K map	**52.**	F (A, B, C, D, E) = Σ m (1, 4, 8, 12, 13,15) + d (3, 14)	2022-23
4	**34**	K Map: 5 & 6 Variable K map, Numerical on K map	**53.**	F (V,W,X,Y,Z) =Σm(0,1,2,4,5,6,10,13,14,18,21,22,24,26,29,30) Simplify the function with the help of K-map and realize the simplified function using basic logic gates.	2022-23
5	**35**	Introduction of Communication system, different components of the system and their importance.	**1.**	Explains the elements of the communication system with the help of block diagrams. OR Define the various elements of the communication system and also draw its functional block diagram. OR Explain the elements of communication system with the help of block diagram. OR Write short note on basic elements of communication system.	2019-20 2022-23 2021-22
5	**36**	Introduction of modulation and its need, Amplitude modulation: Expression, modulation index, Power and current relation of AM	**2.**	(i) Explain Double sideband suppressed Carrier (DSB-SC) Technique (ii) Compare Amplitude Modulation (AM), Frequency Modulation (FM) and Phase Modulation (PM).	2017-18
5	**36**	Introduction of modulation and its need, Amplitude modulation: Expression, modulation index, Power and current relation of AM	**3.**	List any two advantages of modulation. Define modulation. List need of modulation	2019-20 2020-21
5	**36**	Introduction of modulation and its need, Amplitude modulation: Expression, modulation index, Power and current relation of AM	**4.**	What do you mean by amplitude modulation? Explain with help of proper waveforms.	2019-20 2020-21
5	**36**	Introduction of modulation and its need, Amplitude modulation: Expression, modulation index, Power and current relation of AM	**5.**	Define modulation index for AM wave.	2022-23

5	**36**	Introduction of modulation and its need, Amplitude modulation: Expression, modulation index, Power and current relation of AM	**6.**	Derive the transmission efficiency and total power of amplitude modulated wave assuming message and carrier wave as sinusoidal wave. OR Explain amplitude modulation. Derive the expression for the total power radiated by the modulated signal. Also calculate modulation efficiency.	2022-23, 2021-22
5	**37**	Modulator and demodulator Techniques of AM, Numerical problem based on AM	**7.**	A 460 watt carrier is modulated to a depth of 65 percent. Calculate the power in modulated wave	2015-16
5	**37**	Modulator and demodulator Techniques of AM, Numerical problem based on AM	**8.**	An audio frequency signal 5 sin 2π x 500t is used to amplitude modulate a carrier of 25 sin 2π x 10^5 t. calculate: (i) Modulation Index (ii) Sideband Frequency (iii) Amplitude of each sideband (iv) Bandwidth required (v) Total Power (vi) Transmission efficiency	2019-20 2021-22
5	**37**	Modulator and demodulator Techniques of AM, Numerical problem based on AM	**9.**	A 320W carrier is simultaneously modulated by two audio waves with modulation % of 45 and 60 respectively. What is the sideband power radiated?	2019-20
5	**37**	Modulator and demodulator Techniques of AM, Numerical problem based on AM	**10.**	A sinusoidal carrier of 1 MHz and amplitude 100V is amplitude modulated by a sinusoidal modulating signal of frequency 5 KHz providing 50 % modulation. Calculate the frequency and amplitude of USB and LSB.	2017-18
5	**37**	Modulator and demodulator Techniques of AM, Numerical problem based on AM	**11.**	AM radio transmitters radiate 6 KW power when the modulation percentage is 70 %. Determine the carrier power.	2019-20 2020-21
5	**37**	Modulator and demodulator Techniques of AM, Numerical problem based on AM	**12.**	500 watt carrier power is modulated to a depth of 90%, calculating the total power in the modulated wave.	2022-23
5	**37**	Modulator and demodulator Techniques of AM, Numerical problem based on AM	**13.**	An audio frequency signal 10 sin 2π x 500t is used to amplitude modulate a carrier of 50 sin 2π x 10^5 t. calculate: (i) Modulation Index (ii) Amplitude of each sideband (iii) Total power delivered to the load of 2K ohm (iv) Bandwidth	2022-23

5	**37**	Modulator and demodulator Techniques of AM, Numerical problem based on AM	**14.**	An audio frequency signal 20 Sin 2 π x 500 t is used to amplitude modulate a carrier of 40 Sin 2 π x 105t. Calculate : (i) Modulation Index (ii) Sideband Frequency (iii) Amplitude of each sideband (iv) Bandwidth required (v) Total power delivered to the load of 2 KΩ	2022-23
5	**37**	Modulator and demodulator Techniques of AM, Numerical problem based on AM	**15.**	Describe AM modulator with adequate diagram.	2022-23
5	**37**	Modulator and demodulator Techniques of AM, Numerical problem based on AM	**16.**	Calculate the transmission efficiency if the modulation factor is 0.5.	2021-22
5	**37**	Modulator and demodulator Techniques of AM, Numerical problem based on AM	**17.**	Why do we need modulation? The antenna current of an AM transmitter is 8 A. When only the carrier is sent, but it increases 8.93A, When the carrier is modulated by a single sine wave. Find %modulation. Determine the antenna current when the % of modulation changes to 0.8.	2021-22
5	**37**	Modulator and demodulator Techniques of AM, Numerical problem based on AM	**18.**	An audio frequency signal 10 sin 6π *400t is used to amplitude modulate a carrier of 25 sin 4π *10^5 t . Calculate i. Modulation index ii. Amplitude of each side band iii. Total power delivered to the load of 2 KΩ iv. Bandwidth v. Transmission efficiency.	2021-22
5	**38**	Overview of wireless communication, Cellular communication	**19.**	Differentiate between CDMA and GSM?	2020-21
5	**39**	Different generations and standards in cellular communication systems			
5	**40**	Introduction of Radar & Satellite Communication and its basic principles.	**20.**	Write a short note on the satellite communication system. OR Describe briefly Satellite Communication. OR Enlist the merits of Satellite Communication.	2020-21 2021-22
5	**40**	Introduction of Radar & Satellite Communication and its basic principles.	**21.**	What is radar? Write down two applications of RADAR.	2021-22
5	**40**	Introduction of Radar & Satellite Communication and its basic principles.	**22.**	Explain the satellite and radar system using proper block diagrams.	2022-23