R.N.G.PATEL INSTITUTE OF TECHNOLOGY, TAJPORE, BARDOLI
R.N.G.PATEL INSTITUTE OF TECHNOLOGY,

Department of Electrical Engineering

QUESTION BANK

SUBJECT: BASIC ELECTRONICS (3110016)

B.E. – First year [Second Semester]

Branch – Electrical/CSE/IT - 2022

Term: 22/2(Mrch-23 to July-23)

Faculty: Prof. Kevin C. Shah Prof. Megha S. Makwana

Contents:

Instructions for Assignment/Tutorial:

[1] This set of Assignment-Tutorial consist the collection of questions of past GTU Question papers.
[2] Attend those questions which are **bold marked** and/or frequently asked in GTU exam.
[3] Students should make a separate Chapter wise Files [**write on File Pages**] to solve these Questions.
[4] Students must solve these given set of Assignments by themselves only.
[5] Assessment of given assignment should be done regularly after completion of each chapter by Students from the respective faculty members.

1. Course Outcomes:

After learning the Basic Electronics course, student will be able to Learn……..

CHAPTER NO.	CHAPTER NAME	Course Outcomes (CO)
1	Diode theory and applications	CO1:- Analyze the general – and special-Purpose diode circuits
2	Bipolar junction transistors and its biasing	CO2:- Design biasing circuits for BJT.
3	Special purpose diodes and transistors	CO1:- Analyze the general – and special-Purpose diode circuits
4	AC Analysis of BJT circuits and small signal amplifier	CO3:- Analyze BJT Circuits in small-signal domain.
5	Field effect transistors (FET) and its biasing	CO4:- Analyze basic FET Circuits.
6	Digital Circuits	CO5:- Verify the functionalities of basic digital gates and logic families.

2. Course Contents:

SR. NO.	SYLLABUS	TEACHING HOURS	MODULE WEIGHTAGE
1	**Diode theory and applications :** Basic idea about forward bias, reverse bias and VI characteristics, ideal diode, second and third approximation, surface mount diodes, Zener diode, Testing of diode with multi-meter, half wave rectifier, full wave rectifier, bridge rectifier, RC and LC filters, Design of un-regulated DC power supply, Clipping circuit, Clamping circuit, voltage multiplier circuit, Reading datasheet of semiconductor diode.	10	20%
2	**Bipolar junction transistors and its biasing :** BJT operation, BJT voltages and currents, CE, CB and CC characteristics, DC load line and bias point, base bias, emitter feedback bias, collector feedback bias, voltage divider bias, Thermal stability, biasing BJT switching circuits, transistor power dissipation and switching time, Testing of bipolar junction transistor with multi-meter, Reading datasheet of BJT.	10	20%
3	**Special purpose diodes and transistors:**Light emitting diode (LED). Zener diode, Zener diode circuit for voltage regulation, Photo diode, Solar cell, PIN diode, Varactor, Schottky diode, Varistors, Tunnel diode, Seven Segment display, Sixteen segment display, Identify segments on pin using multi-meter, Dot-matrix LED display, Photo transistor, Opto-coupler, Reading datasheet of opto-electronics devices	04	10%
4	**AC Analysis of BJT circuits and small signal amplifier :** Coupling and bypass capacitors, AC load lines, Transistor models and parameters, Common emitter circuit analysis, common base circuit analysis, common collector circuit analysis, Comparison of CE, CB and CC circuits, Transistor as a switch	10	20%
5	**Field effect transistors (FET) and its biasing :** Junction field effect transistors(JFET), Comparison of BJT and FET, JFET characteristics, FET, Biasing in ohmic region and active region, Trans-conductance, amplification and switching, MOSFETs (D-type and E-type MOSFET), CMOS introduction, E-MOSFET amplifier. MOSFET testing,	10	20%

	Reading datasheet for FET and MOSFET.		
6	**Digital Circuits** Basic gates AND, OR,NOT, NAND, NOR, EX-OR, EX-NOR, Building AND, OR Gate with diodes, Digital logic families RTL, DTL, TTL, CMOS, Comparison of logic families	04	10%

3. List of Reference Books:

1. **David A. Bell, "Electronic Devices and Circuits", Oxford University Press, Fifth edition.**
2. **Albert Malvino& David, "Electronic Principles", Tata McGraw-Hill, Seventh edition.**
3. **R. L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education.**
4. Jaccob Millman, Chritos Halkias, Chetan D Parikh, "Integrated Electronics", Tata McGraw-Hill, Second edition.
5. Albert Malvino & David, "Problems and Solutions in Basic Electronics, McGraw Hill Education.

4. List of Experiments:

SR. NO.	LIST OF EXPERIMENTS
1	TO STUDY ELECTRONIC SYMBOLS AND UNITS.
2	TO STUDY CHARACTERISTICS OF C.R.O. AND MEASUREMENT OF VOLTAGE AND FREQUENCY ON C.R.O.
3	TO STUDY CHARACTERISTICS OF GIVEN P-N JUNCTION DIODE.
4	TO OBTAIN CHARACTERISTIC OF ZENER DIODE.
5	TO VERIFY I/P & O/P CHARACTERISTIC OF TRANSISTOR [CE] CONFIGURATION.
6	TO STUDY HALF WAVE RECTIFIER WITH & WITHOUT FILTER.
7	TO TEST FULL WAVE & BRIDGE RECTIFIER WITH FILTER WITH & WITHOUT FILTER.
8	TO TEST THE CLIPPER & CLAMPER CIRCUITS.
9	TO STUDY FREQUENCY RESPONSE OF TWO STAGE R-C COUPLED TRANSISTOR AMPLIFIER.
10	TO TEST CHARACTERISTICS OF A FIELD EFFECT TRANSISTOR.
11	VERIFY THE TRUTH TABLE OF BASIC DIGITAL LOGIC GATES.

5. Major Equipments required for Experiments:

1. C.R.O.
2. Function Generator.
3. DC Power Supply.
4. Bread Board and Discrete Electronics Components.

6. List of Open Source Software/learning website:

- http://nptel.ac.in/syllabus/117103063/
- https://swayam.gov.in/course/3595-basic-electronics
- eSIM available on FOSSEE website: https://fossee.in/

7. Active Learning Assignments and tutorial

1	**Diode theory and applications :** Basic idea about forward bias, reverse bias and VI characteristics, ideal diode, second and third approximation, surface mount diodes, Zener diode, Testing of diode with multi-meter, half wave rectifier, full wave rectifier, bridge rectifier, RC and LC filters, Design of un-regulated DC power supply, Clipping circuit, Clamping circuit, voltage multiplier circuit, Reading datasheet of semiconductor diode.

QUESTIONS AND EXAMPLES:

SR. NO.	QUESTION	YEAR	MARKS
	THEORY		
1.	Differentiate between insulator, conductor and semiconductor.	JUNE-19 MAR-23	03
2.	Define Bulk Resistance and Barrier Potential.	DEC-14	03
3.	Discuss about VI characteristics of Ideal Diode.	DEC-19	03
4.	Explain forward bias PN junction diode with diagram.	JUNE-19	04
5.	**Explain the formation of barrier potential in open circuited PN junction diode.**	**DEC-11**	**07**
6.	Explain Bridge rectifier with diagram.	DEC-19	04
7.	Compare Zener and Avalanche breakdown.	DEC-09 MAR-23	04
8.	**Draw diode I-V characteristic and explain diode static and dynamic resistances.**	**MAY-13 MAR-23**	**07**
9.	**Compare V-I characteristics of Silicon and Germanium p-n junction diode.**	**DEC-09**	**04**
10.	Mention three application of PN Junction diode.	MAY-16	03
11.	What is break down diode?? Explain working of zener break down and avalanche break down	JUNE-19	07
12.	**Define the rectification and describe the full wave bridge rectifier with the help of neat circuit diagram and waveforms.**	**DEC-11 MAY-13 MAY-14 DEC-15 JUNE-19 MAR-23**	**07 04 07**
13.	Draw the circuit diagram of Half wave rectifier.	DEC-19	03
14.	**Explain the working Half-wave rectifier with necessary waveforms. Obtain expression for dc output voltage. Explain the working Half-wave rectifier with necessary waveforms**	**MAY-16 DEC-16**	**07**

	for voltage across diode, diode current with filter.		
15.	**Explain the working of Center tapped full wave rectifier with necessary waveforms.**	**MAY-15**	**07**
16.	Derive Efficiency for Full wave rectifier.	MAY-16	07
17.	**Compare half wave, full wave and bridge rectifier.**	**DEC-14**	**07**
18.	Explain capacitive filter with ripple factor.	MAY-16	07
19.	State different types of diodes. Describe process of testing diode with multi meter	JUNE-19	04
20.	**Explain the different types of clipping circuits.**	**DEC-11** **JUNE-19**	**07** **03**
21.	Draw double-diode clipper circuit which limits output voltage at two independent levels. Explain its working with necessary waveforms.	MAY-13	07
22.	**Explain the different types of clamping circuits.**	**DEC-11**	**07**
23.	Explain the difference between clipping and clamping circuit. A positive voltage clamping circuit and a positive voltage clipping circuit each have ±12 V square wave input. Sketch the output waveform for each circuit.	DEC-19	07
24.	Design a series noise clipping circuit which rectify the noise signal with amplitude lower than $\pm V_F$.		
25.	Draw Voltage Multiplier circuit.	DEC-19 MAR-23	03
26.	**Explain the diode as a voltage multiplier.** **What is voltage multiplier? Draw and explain full wave voltage doubler.**	**MAY-17**	**07**
27.	What is a diode? Write its types and applications.	**AUG-22**	**03**
28.	Explain the diode V-I characteristics of ideal and practical PN junction semiconductor diode.	**AUG-22**	**04**
29.	Enumerate the different types of clipping circuits with their different names and input-output waveforms.	**AUG-22**	**07**
30.	Discuss different types of diodes. Describe process of testing diode with multi meter.	**MAR-23**	**04**

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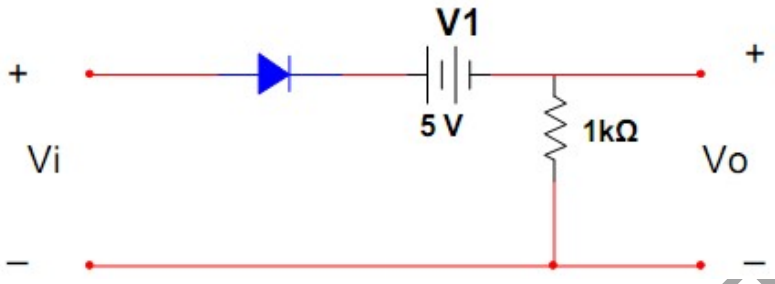
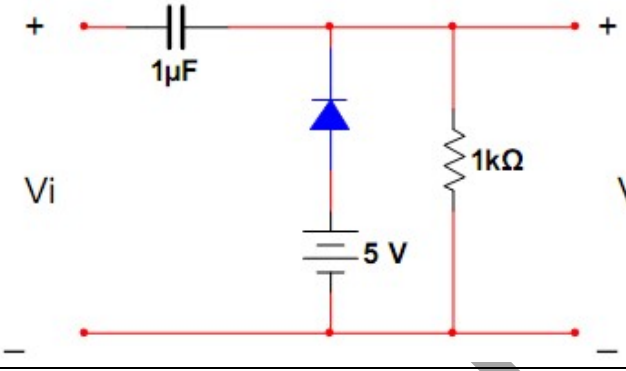
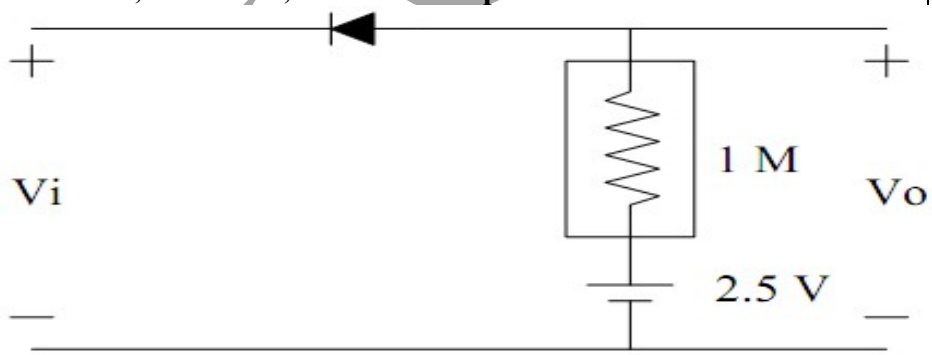
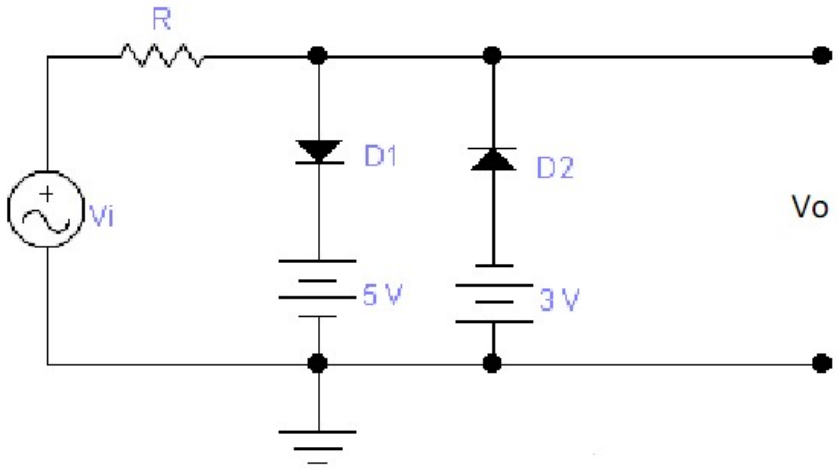
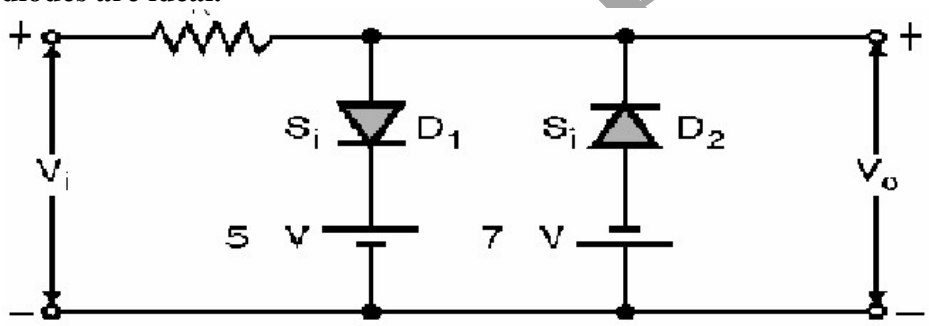
EXAMPLES

1.	**Draw output waveform of following circuits. Consider input of 20V (peak topeak), 10 kHz sine wave and assume ideal diode.** **(i)**  **(ii)** 	**MAR-10**	**06**
2.	**A symmetrical 5-kHz square wave whose output varies between +10V and -10Vis impressed upon the clipping circuit shown in Fig. Assume diode forwardresistance (R_f) as zero, diode reverse resistance as (R_r) 2M, diode cut-in voltage(V_γ) as zero. Sketch the steady-state output waveform, indicating numericalvalues of the maximum, minimum, and constant portions.** 	**MAY-11**	**07**

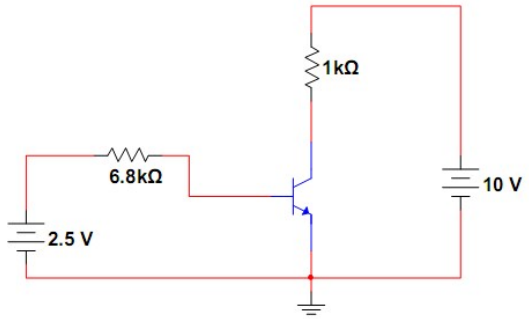
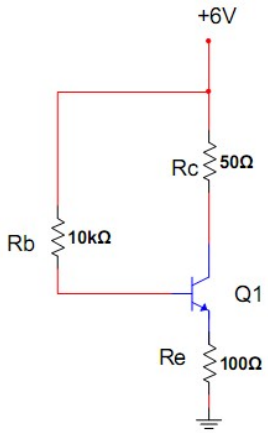
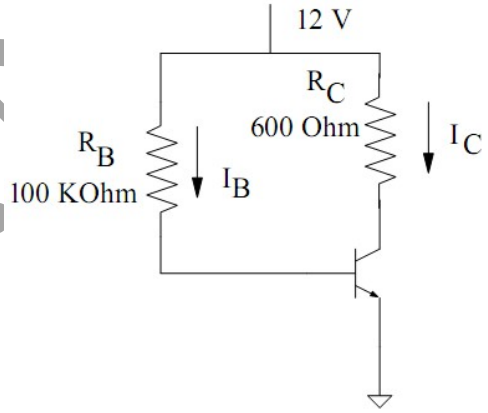
3.	**Figure shows the two way clipper. If the input voltage is sinusoidal source of 16v peak-to-peak, sketch the output waveform. (Assume voltage drop across diodes is 0.7v)** 	**MAY-12**	**05**
4.	**A sinusoidal voltage peak value of 10V and frequency 50 Hz is applied at the input of clipping circuit shown in figure below. Draw output voltage waveform and transfer characteristic. Assume both diodes are ideal.** 	**JAN-13**	**07**

2	**Bipolar junction transistors and its biasing :** BJT operation, BJT voltages and currents, CE, CB and CC characteristics, DC load line and bias point, base bias, emitter feedback bias, collector feedback bias, voltage divider bias, Thermal stability, biasing BJT switching circuits, transistor power dissipation and switching time, Testing of bipolar junction transistor with multi-meter, Reading datasheet of BJT.

QUESTIONS:

SR. NO.	QUESTION	YEAR	MARKS
	THEORY		
1.	Write the advantages of transistor and explain why it is called "Bipolar Transistor".	DEC-15 JUNE-19	04 03
2.	**Explain transistor construction with size and doping level of each region.**	**DEC-16**	**03**
3.	**Explain following for NPN transistor.** (i) **Current components.** (ii) **Regions of operation according to biasing condition**	**DEC-09**	**05**
4.	**Indicate and briefly explain various current components flowing in PNP transistor with forward biased emitter junction and reverse biased collector junction.**	**MAY-13**	**07**
5.	**Draw the symbol of NPN and PNP transistor. What is use of transistor?**	**JUNE-19**	**03**
6.	**Derive relationship between α_{dc} and β_{dc} of a transistor.**	**MAR-10 JAN-13 MAR-23**	**04**
7.	Draw the circuit of transistor in CE configuration. Sketch the output characteristics and explain active, saturation and cutoff regions.	JUNE-19	07
8.	**Draw CE transistor configuration and give its input and output characteristics. Also derive the relation between current gain of CE, CB and CC configurations.**	**DEC-09 MAR-23**	**07**
9.	**Draw and explain the input and output characteristics of p-n-p silicon transistor in CB configuration. Indicate cut off, saturation and active regions.** **Draw and explain the input and output characteristics of n-p-n silicon transistor in CB configuration. Indicate cut off, saturation and active regions. (early effect)**	**MAR-10 MAY-12 MAY-13**	**06**
10.	**Draw the circuit of CE configuration of transistor. Explain Input and output characteristics. Derive $\alpha = \beta / \beta+1$**	**DEC-10**	**07**
11.	Explain the output characteristic of n-p-n transistor in CE configuration. Also indicate different regions.	DEC-11	**07**
12.	What is early effect in CB configuration? Explain with graph.	JAN-13	**03**
13.	Why CE configuration is preferred for amplification?	JAN-13	**03**
14.	Compare CE, CB and CC configuration with respect to different transistor characteristics.	JUNE-19	**07**

15.	Explain the selection of a Q point for a transistor bias circuit and discuss the limitations on the output voltage swing.	DEC-19	**04**
16.	Explain about DC load line and bias point of transistor.	DEC-19	**03**
17.	**Explain DC load line and Q-point for any transistor configuration. Also state the necessity of biasing and list biasing methods for transistor.**	**DEC-11 MAR-23**	**07**
18.	Explain AC loadline with respect to BJT	**JUNE-19**	**04**
19.	**State the need of biasing. Discuss voltage divider bias circuit and mention its advantages. OR What is biasing? Why biasing is required for transistor? List biasing methods for transistor. Draw and explain the circuit of voltage divider biasing.**	**DEC-09 DEC-10 JUNE-19**	**07**
20.	What do you understand by bias stability in transistor amplifier circuit? Explain thermal instability of bias point for the same.	MAY-13	**07**
21.	**Define stabilization factors: S, S', and S". Derive expressions for S and S' forself-bias transistor Circuit.**	**MAY-11**	**07**
22.	**Draw collector to base bias circuit and explain its operation. Also state advantages and disadvantages of the circuit.**	**DEC-12**	**07**
23.	**Draw an emitter bias circuit and explain its operation. Explain why it works well in amplifying circuits.**	**DEC-17**	**07**
24.	Why are junction transistors called bipolar devices?	AUG-22	03
25.	Sketch the circuit of the common collector mode of BJT and its output characteristics. Derive the expression for the collector current and gain.	AUG-22	07
26.	Draw the fixed-biased circuit by considering an n–p–n transistor in the CE mode. Derive the expressions for stability factors. What are the functions of the coupling capacitors?	AUG-22	07
27.	What is the thermal runaway in transistors, and how can it be avoided?	AUG-22	03
28.	What is an Early effect, and how can it account for the CB input Characteristics?	AUG-22	04
29.	The value of alpha increases with the increasing reverse-bias voltage of the collector junction. Why?	AUG-22	04
30.	Why biasing is important in transistor? Explain voltage divider bias with diagram.	MAR-23	07
31.	Explain the selection of a Q point for a transistor bias circuit and discuss the limitations on the output voltage swing.	MAR-23	04
32.	Compare CB and CC configuration with respect to different transistor Characteristics.	MAR-23	07
33.	Explain application of transistor as a switch.	MAR-23	07
	EXAMPLES		
1.	**In npn transistor $\alpha = 0.98$, $I_E = 20$ mA, $I_{CBO} = 3\mu A$. Determine I_C, I_B, ß and I_{CEO}**	**JAN-13**	**04**
2.	**Determine whether or not the transistor in below circuit is in saturation. Assume $\beta = 50$ and $V_{CE(sat)} = 0.3V$, $V_{BE} = 0.7V$.**	**MAR-10**	**04**

			
3.	For following circuit, calculate the minimum and maximum value of emitter current when β of transistor varies from 75 to 150. Also calculate the corresponding values of collector to emitter voltage. Take V_{BE} = 0.3V, Rb=10 KΩ, Rc= 50 Ω, Re= 100 Ω, Vcc= +6V. 	MAR-10	06
4.	**The fixed-bias circuit is given in Fig. and it is subjected to an increase in temperature from 25 ˚C to 75 ˚C. If β = 100 at 25 ˚C and β = 125 at 75 ˚C, determine the percentage change in Q point values (V_{CE}, I_C) over the temperature range. Neglect any change in V_{BE}. Take V_{BE} = 0.7 V.** 	**MAY-11**	**07**
5.	Design a fixed bias circuit using silicon npn transistor Which has β_{dc} = 150. Thedc biasing point is V_{CE} = 5V And I_c = 5 mA Supply voltage is 10V.Writeadvantages and disadvantages of fixed biascircuit.	DEC-10	07

3	**Special purpose diodes and transistors:**Light emitting diode (LED). Zener diode, Zener diode circuit for voltage regulation, Photo diode, Solar cell, PIN diode, Varactor, Schottky diode, Varistors, Tunnel diode, Seven Segment display, Sixteen segment display, Identify segments on pin using multi-meter, Dot-matrix LED display, Photo transistor, Opto-coupler, Reading datasheet of opto-electronics devices

QUESTIONS:

SR. NO.	QUESTION	YEAR	MARKS
	THEORY		
1.	Draw symbol and explain briefly the working principle of breakdown diode and tunnel diode.	DEC-10	04
2.	**Explain VI characteristics of Zener diode.**	**MAY-16**	**04**
3.	**Explain how Zener diode regulates voltage.**	**JAN-13**	**03**
4.	**Why Zener diode can be used as voltage regulator? Explain Zener as voltage regulator with necessary diagram.**	**DEC-19**	**04**
5.	**Explain LED diode.**	**JUNE-19**	**03**
6.	Explain PIN photo diode	DEC-17 DEC-19 JUNE-19 MAR-23	04
7.	**Explain principle and applications of LED.**	**DEC-10**	**03**
8.	**Explain principle and applications of photodiode.**	**DEC-09**	**04**
9.	Compare LED and photodiode.	DEC-15	04
10.	**Explain working of Schottky diode. Advantages and Disadvantages over common diode and applications.**	**MAY-15**	**07**
11.	**What is varactor diode? How capacitance of a diode varies with reverse voltage?**	**JUNE-19 AUG-22 MAR-23**	**03**
12.	Explain Varactor diode and varistor.	DEC-19	03
13.	**Draw and explain seven segment display.**	**DEC-19**	**04**
14.	**Explain working of Photo transistor.**	**MAY-12**	**03**
15.	Explain applications of optocoupler.	DEC-15 MAY-17	03
16.	Write a short note on the optocoupler device?	AUG-22	03
17.	Explain the sixteen segment display and its applications with the necessary circuit diagram.	AUG-22	04
18.	Explain the contraction of the solar cell with its operational principle	AUG-22	04
19.	**Explain Dot Matrix LED display.**		**07**

4	**AC Analysis of BJT circuits and small signal amplifier :** Coupling and bypass capacitors, AC load lines, Transistor models and parameters, Common emitter circuit analysis, common base circuit analysis, common collector circuit analysis, Comparison of CE, CB and CC circuits, Transistor as a switch

QUESTIONS:

SR. NO.	QUESTION	YEAR	MARKS
	THEORY		
1.	**Explain the role of coupling capacitor and bypass capacitor in amplifier circuit.**	**DEC-17** **JUN-19**	**04** **03**
2.	Explain small signal common emitter amplifier.	DEC-16	04
3.	Explain difference between AC and DC load line.	MAY-16	04
4.	Explain the working of Transistor as switch.	DEC-19	03
5.	**Draw T model and π model circuit for CE amplifier.**	**DEC-15**	**03**
6.	**Explain the operation of emitter follower amplifier. Why is it named as emitter follower?**	**DEC-09**	**07**
7.	**Briefly explain the h-parameters and draw h-parameter based equivalent circuit for CE transistor and derive equation for input impedance, output impedance and voltage gain.**	**DEC-19**	**07**
8.	**Derive expressions for Ai, Ri, Av and Yo in terms of CE h-parameters for emitter follower circuit.**	**MAY-11**	**07**
9.	**Explain the operation of common Base amplifier.**		
10.	Explain the operation of common Emitter amplifier.		
11.	**Compare current gain, voltage gain, input impedance and output impedance of CE, CB and CC configuration of transistor.**	**DEC-10**	**07**
12.	**Draw the approximate hybrid model for any transistor configuration at low frequencies. Show that only hie and hfe are essential in the model. Is the approximation justified?**	**AUG-22**	**07**
13.	What is the ac load line in the transistor? Write its significance.	**AUG-22**	**03**

5	**Field effect transistors (FET) and its biasing :** Junction field effect transistors(JFET), Comparison of BJT and FET, JFET characteristics, FET, Biasing in ohmic region and active region, Trans-conductance, amplification and switching, MOSFETs (D-type and E-type MOSFET), CMOS introduction, E-MOSFET amplifier. MOSFET testing, Reading datasheet for FET and MOSFET.

QUESTIONS:

SR. NO.	QUESTION	YEAR	MARKS
	THEORY		
1.	What is FET? State important features of FET.	JUNE-19	03
2.	**Explain FET as an Amplifier.**	**DEC-19 MAR-23**	**04**
3.	Give points of difference between BJT and FET. Also Explain FET as voltage variable device.	DEC-09 DEC-13	07
4.	**Compare BJT and FET.**	**JUNE-19**	**04**
5.	**Write short note on JFET.**	**JUNE-19**	**07**
6.	Give constructional details of JFET and give its characteristics. Why FET is called voltage controlled device?	DEC-09	07
7.	Explain Transconductance and switching in FET.	DEC-19	04
8.	Explain (i) Unipolar device (ii) Transconductance	JUNE-19	04
9.	**Draw and explain the construction, depletion region, operation and drain characteristics of N-Channel JFET.**	**DEC-14 DEC-19 MAR-23**	**07**
10.	**Explain the input and transfer curve for JFET using Shockley's equation.**	**MAY-16**	**07**
11.	How JFET are biased?	DEC-16	04
12.	**Define parameters of FET and state relationship among them.**	**DEC-12 AUG-22**	**04**
13.	Explain the application of JFET as shunt switch and series switch.	MAY-15	07
14.	Compare FET and BJT devices.	DEC-14 MAY-16	07
15.	**What are advantages of JFET over BJT?**	**DEC-16**	**03**
16.	Write short note on MOSFET.	JUNE-19	07
17.	**Explain the construction, working and characteristics of N-channel depletion type MOSFET.**	**MAY-16**	**07**
18.	**Explain the construction, working and characteristics of N-channel Enhancement type MOSFET.**	**MAY-15 DEC-17**	**07**

19.	Explain the construction, working and characteristics of P-channel depletion type MOSFET.	MAY-11	07
20.	Compare Depletion and Enhancement type MOSFET.	DEC-14	07
21.	Write a short note on E MOSFET as an Amplifier.	DEC-19	04
22.	**Compare BJT with FET and explain D MOSFET.**	**DEC-19**	**07**
23.	What is MOSFET device? Draw its construction diagram.	**AUG-22**	**03**
24.	Write short notes on the following : (i) Advantages of JFET (ii) Difference between MOSFET and JFET	AUG-22	04
25.	Compare the different characteristics of the following semiconductor devices: bipolar junction transistor, field-effect transistor.	AUG-22	07
26.	How will you determine the drain characteristics of JFET? What do they indicate?	AUG-22	03
27.	Explain the common drain configuration for a JFET.	AUG-22	04
28.	Draw and explain the self-bias circuit of FET.	MAR-23	04
29.	**Write a short note: E-Type MOSFET.**	**MAR-23**	**07**
30.	What are the advantages of N-Channel MOSFET over P-Channel MOSFET?	MAR-23	04

6	**Digital Circuits** Basic gates AND, OR,NOT, NAND, NOR, EX-OR, EX-NOR, Building AND, OR Gate with diodes, Digital logic families RTL, DTL, TTL, CMOS, Comparison of logic families.

QUESTIONS:

SR. NO.	QUESTION	YEAR	MARKS
	THEORY		
1.	**Draw symbol and explain truth table of all basic logic gates**	**JUNE-19 MAR-23**	**07**
2.	**Write truth table of AND, NAND and NOR gates.**	**DEC-19**	**03**
3.	**Explain (i)universal gate (ii) EX-OR logic gate**	**JUNE-19**	**04**
4.	Among TTL and CMOS digital logic family which one is better and why?	JUNE-19 MAR-23	04
5.	**Comparison of TTL, CMOS, RTL and DTL logic families.** **OR** **Give comparison between different types of digital logic families.**	**JUNE-19**	**07**
6.	**Compare the logic families and explain any one of them.**	**DEC-19**	**07**
7.	**Draw a Schematic of a typical CMOS digital switching circuit and explain its operation.**	**DEC-17**	**07**
8.	**Explain Ex-OR and Ex-NOR gate with truth table and construct OR gate using diodes.**	**DEC-19**	**07**
9.	What do you mean by the logic gate and its types? Explain the universal logic gates.	AUG-22	07
10.	Explain the logic families and their types. Describe the characteristics of the same.	AUG-22	07
11.	Design and explain basic NAND gate using DTL logic.	MAR-23	03
12.	**Explain why NAND and NOR gate are called universal gate?**	**MAR-23**	**04**
13.	**Draw Electrical equivalent circuit of AND, NOR, EX-OR and EX-NOR gate.**		
14.	Explain multiple inputs OR gate.		
15.	**Explain Noise margin, Fan-in, Fan-out, Propagation delay and Power Dissipation.**		
16.	Explain 2-input RTL NOR gate.		
17.	Write advantages and disadvantages of CMOS.		