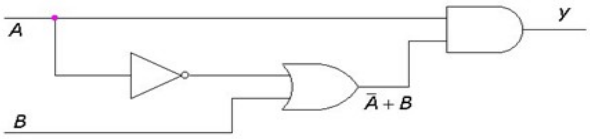
Basic Electronics question bank

Q. No.	UNIT-I
1	Differentiate between Zener breakdown and Avalanche breakdown.
2	Define α and β. Bring out the relationship between α and β.
3	Design a Zener regulator for the following specifications: output voltage =5v, input voltage ±3v, I_{Zmin}=10mA, load current =20mA, Zener wattage 500mW.(**different problems on design of zener diode is expected)**
4	With neat circuit diagram and waveform, explain input and output characteristics of CE configuration.
5	Compare PN junction diode with Zener diode.
6	Give the advantages and disadvantages of capacitor filter.
7	With neat circuit diagram and waveform give the approximation of the capacitor filter for full wave rectifier.
8	Explain the working of npn transistor with neat diagram.
9	Plot and explain the characteristics of a diode.
10	Derive the expression for the following parameters of the full wave rectifier circuit: (i) Average DC current (ii) RMS value of current (iii) Ripple factor (iv)Efficiency
11	Compare CE transistor configuration.
12	Explain the working of half wave rectifier with capacitor filter with neat circuit diagram and waveform.
13	Explain ideal and linear piecewise diode approximation with equivalent models.
14	(i) Find IE , αdc , βdc of a transistor with Ic = 5.25 mA and IB =100μA (ii) find the new IB for an Ic of 15mA(this is a sample numerical,more numerical based on this is expected)
15	Compare half wave, full wave and bridge rectifier circuits.
16	Explain load and line regulation with neat diagram and equations.
17	Derive the expression for the following parameters of the bridge rectifier circuit: (i) Average DC current (ii) RMS value of current (iii) PIV
18	Derive the expression for the following parameters of the half wave rectifier circuit: (i) Average DC current (ii) RMS value of current (iii) PIV (iv) Efficiency
19	Explain the working of PNP transistor with neat diagram.
20	Explain voltage amplification in the transistor circuit with neat diagram and example.
21	A full wave bridge rectifier supplies the load of 400Ω in parallel with a capacitor of 500μF.If the AC supply voltage is 230sin314tV, find the (i) ripple factor (ii) DC load current.(this is a sample problem, all rectifier and filter problems are expected)
22	Why CE configuration is widely used in amplifier circuits?
23	Explain V-I characteristics of a PN junction diode. Give the applications of the diode.
24	Explain diode approximation with equivalent model.
25	Explain how current amplification can be achieved in the transistor circuit.
26	Explain the working of Zener diode and give its applications.
27	Explain the working operation of forward and reverse biased diode with neat diagram and characteristics.
28	Explain Full wave rectifier with neat circuit diagram and waveform. List out the advantages and disadvantages of the same.
29	Explain bridge rectifier with neat circuit diagram and waveform. List out the advantages and disadvantages of the same.
30	Explain Full wave rectifier with capacitor filter with neat circuit diagram and waveform. List out the advantages and disadvantages of the same.
31	Explain the working operation of un-biased diode with neat diagram.
32	Explain the selection of operating point for CE transistor.
33	Explain the ac analysis circuit (for CE)
	UNIT 2
1.	Explain BJT operation by drawing neat basic structures.
2.	Explain common emitter circuit working for AC input signal
3.	Draw the DC load line for the BJT transistor and explain the significance of Q point.

4.	Illustrate voltage divider bias by taking accurate analysis with the help of circuit diagram and equations.
5.	Illustrate voltage divider bias by taking approximate analysis with the help of circuit diagram and equations.
6.	A voltage divider bias circuit has Vcc=15v, Rc=2.7Kohms, Re=2.2Kohms, R1=22kohms, R2=12Kohms. Calculate Ve, Vc, Ic, Vce and draw DC load line with Q point.
7.	Describe the important conditions for the sustained oscillations.
8.	Draw circuit BJT phase shift oscillator and explain its working principle.
9.	Explain the working of colpitts oscillator with its working principle.
10.	Explain the working of Hartley oscillator and with its working principle
11.	Related problems on frequency oscillations A Hartley Oscillator circuit having two individual inductors of 0.5mH each, are designed to resonate in parallel with a variable capacitor that can be adjusted between 100pF and 500pF. Determine the upper and lower frequencies of oscillation and also the Hartley oscillators bandwidth.
12.	Explain DC load line and Q point using base bias ckt
13.	Explain DC load line and Q point using voltage divider bias ckt
	Unit-3
1	With neat circuit diagram and characteristics explain the working operation/principle of JFET
	Write a short note on i) transconductance ii) Amplification factor iii) Drain resistance
2	With neat circuit diagram and characteristics explain the working operation/principle of MOSFET(both type enhancement and depletion)
	Explain the construction and working of CMOS
3	Compare the practical (μA741) and ideal characteristics of an Op-amp.
4	With neat circuit diagram, show how Op-amp can be used as inverting amplifier.
5	Define (i) slew rate (ii) input bias current (iii) input offset voltage
6	With neat circuit diagram, show how Op-amp can be used as non-inverting amplifier.
7	Explain the block diagram of an Op-amp.
8	Define (i) CMRR (ii)PSRR (iii) Bandwidth
10	An Op-Amp is used as an inverting amplifier to amplify an input Sine wave of amplitude 100mV (peak to peak). The input resistance R1=1kΩ and feedback resistance Rf= 10kΩ. Calculate the voltage gain and sketch the output waveform with neat circuit diagram.
11	Design an scaling adder using Op-amp to give the output Vo= -(8V1+4V2+2V3)(sample example,different numerical on adder is expected)
12	With neat circuit diagram, show how Op-amp can be used as inverting summer.
13	Explain how Op-amp can be used as voltage buffer.
14	Explain (i) virtual ground concept (ii)differential gain
15	With neat circuit diagram, show how Op-amp can be used as inverting subtractor.
17	With neat circuit diagram, show how Op-amp can be used as integrator.
18	Explain (i) common mode gain (ii) CMRR
19	What is the difference between open loop gain & closed loop gain?
20	With neat circuit diagram, show how Op-amp can be used as Differentiator.
22	What are the advantages of negative feedback of an op-amp?
23	With neat circuit diagram, show how Op-amp can be used as inverting adder with three inputs.
24	Explain (i)Input impedance (ii) open loop gain (iii) input offset current
25	Explain (i) Differential gain (ii) PSRR
26	List the linear applications of an op-amp and explain any two.
	Unit-4
1	Convert the following i) (CF.2B)16 = (?)8 ii) (A2B.DB)16 = (?)2 iii) (8E.CB)16 = (?)10
2	Perform the following using 1's complement method (i)(13)10 - (86)10 (ii)(1000111)2 - (100111)2

3	Design and Realize Half Adder using i)Logic gates ii)only NAND Gates iii)only NOR gates
4	Realize the following basic gates using only NAND gates i)AND gate ii)OR Gate iii)NOT Gate
5	Convert the following i) (128.75)10 = (?)8 ii) (285.25)10 = (?)2 iii) (73.46)10 = (?)16
6	Simplify the following equation using Boolean laws and implement the simplified function using i)Basic Gates ii)only NAND gates iii)Only NOR Gates Y=$\left(A+\bar{B}+C\right)\left(\bar{A}+\bar{B}+\bar{C}\right)\left(\bar{A}+B\right)$(A+C)
7	Perform the following using 2's complement method (i)(35)10 - (73)10 (ii)(10001)2 - (100111)2
8	Convert the following i) (100011.100110)2 = (?)8 ii) (101011.00101)2 = (?)10 iii) (101101.0101)2 = (?)16
9	Realize Ex-NOR logic gate using i)Only NAND gates ii)Only NOR Gates iii)Basic Gates
10	Obtain the simplified expression form the circuit shown and then write the truth table
11	
12	Perform the following subtraction (i) (123)10 - (73)10 using 2's complement method (ii)(100011)2 - (10011)2 using 1's complement method
13	Simplify the following equation using Boolean laws and Demorgan's theorem and implement the simplified function using i)Basic Gates ii)Only NAND gates iii)Only NOR gates F=AC[B+C($\overline{AB+A\bar{C}AB+A\bar{C}}$)]
14	Convert the following i) (10011.100101)2 = (?)8 ii) (11101111.10101)2 = (?)10 iii) (100111.110101)2 = (?)16
15	Simplify the following equation using Boolean laws and De Morgan's theorem and implement the simplified function using i)Basic Gates ii)only NAND gates iii)Only NOR Gates Y= AB($\overline{\left(AB+CD\right)\left(ABC+D\right)}$)
16	Perform the following subtraction (i)(54)10 - (16)10 using 1's complement method (ii)(1001)2 - (100111)2 using 2's complement method
17	Convert the following i) (67.26)8 = (?)10 ii) (16.77)8 = (?)2 iii) (45.16)8 = (?)16

18	Define and explain all the basic laws/postulates of Boolean Algebra
19	Realize Ex-OR logic gate using i)Only NAND gates ii)Only NOR Gates iii)Basic Gates
20	Perform the following using 2's complement method (i)(35)10 - (73)10 (ii)(100101)2 - (101011)2
21	Simplify the following equation using Boolean laws and Demorgan's theorem and implement the simplified function using i)Basic Gates ii)Only NAND gates iii) NOR gates $y = A(\overline{ABC} + \overline{ABC})$
22	Convert the following i) (37.75)8 = (?)10 ii) (16.75)8 = (?)2 iii) (45.16)8 = (?)16
23	Realize the following basic gates using only NOR gates i)AND gate ii)OR Gate iii)NOT Gate
24	Convert the following i) (ECF.2B)16 = (?)8 ii) (18.CB)16 = (?)10 iii) (42.25)16 = (?)8
25	Perform the following subtraction (53)10 - (16)10 using 1's complement method (100011)2 - (1011)2 using 2's complement method
26	Simplify the following equation using Boolean laws and DE Morgan's theorem and implement the simplified function using i)Basic Gates ii)Only NAND gates iii)Only NOR gates F=A[B+C($\overline{AB + AC}\overline{AB + AC}$)]
27	Convert the following i) (28.75)10 = (?)8 ii) (25.25)10 = (?)2 iii) (7.46)10 = (?)16
28	Perform the following using 2's complement method (i)(23)10 - (73)10 (ii)(1100011)2 - (100011)2
29	Convert (725.25)8 = (?)1 0= (?)2 =()16
30	Subtract (111001)2 from (101011)2 using 2's complement method
31	write the Truth table of an X-OR function and realize this using(i) only NAND gates (ii) only NOR gates
32	Realize the following expression using Basic gates Y=B'C'+A'C'+A'B'
33	What is a Half adder? Implement it using Universal gates
34	Subtract using 2's complement and 1's complement method (15-7)10
35	Simplify and realize the following expression using NAND gates Y=AB'C'+A'B'C'+A'B'+AC'
36	Perform the following i) (101010111100)2 = (?)8 = (?)16 = ()10
37	state and prove DE Morgan's Law using Truth Table
38	Subtract (64)10 - (66)10 using 2's complement method
39	Design a full adder circuit and Realize using two half adders.
40	simplify the following Boolean expression and realize them using logic gates Y=ABC+AB'C+ABC'
41	Simplify the following equation using Boolean laws and De Morgan's theorem and implement the simplified function using i)Basic Gates ii)only NAND gates Y= [(A+B'C)(A'+B'+C')(A'+B)]'
42	Realize the following basic gates using only NOR Gates i)AND gate ii)OR Gate iii)NOT Gate
43	convert the following (101011.1111001)2=()8=()16=()10
44	simplify and realize using only NOR gates y=AB'C'+A'B'C'+B'C'+AC'
45	Subtract (111001) 2 from (10101)2 using 2's complement method

46	Define Full Adder; implement Full Adder using Logic gates.
47	Realize Half Adder using (NAND,NOR,BASIC and LOGIC) gates
48	Convert the following (64.6)10= (?)2= (?)16= (?)8
49	simply the following expression i)F=C(B+C)(A+B+C) ii)F=(A+B'+C')(A+B'+C)
50	Realize Full adder using (NAND,NOR,BASIC and LOGIC) gates
51	Realize EX-OR gate using (i) NOR Gates only(ii) NAND gates only
52	simplify the following Boolean expression and realize them using logic gates F=(A+BC')(A'+B+C')
53	perform the following binary subtraction (100010)2- (11101)2 using (i) 1's complement method(ii) 2's complement method
54	Compare combinational logic circuit and sequential circuit with example.
55	Explain SR latch using NAND gates with functional table.
56	Explain the operation of clocked RS flip flop with circuit, functional table and timing diagram.
57	Give the classification of flip flops and mention the applications of flip flops.
58	Draw the SR latch circuit using NOR gates and explain its operation with functional table.
59	How latch is different from flip flop?
60	Design full adder using two half adders
	UNIT 5
1.	Describe the operation of a photo-electric transducer with neat diagram.
2.	Discuss the different types of thermistors.
3.	Explain the working of thermistor in detail with its diagram.
4.	Compare active and passive transducers with example.
5.	Explain photo electric transducers.
6.	Explain piezo- electric transducers.
7.	List some of the desirable properties of an ideal transducer.
8.	Give explanation of thermistor in detail with its diagram.
9.	Illustrate the working of thermocouples in detail with its diagram.
10.	Elaborate any two photo electric transducers.
11.	Explain photo voltaic and photoconductive transducers.
12.	Describe the working principle of resistive transducer.
13.	What are transducers? Explain Photo conductive transducers.
14.	With neat block diagram explain the working of basic analog communication system.
15.	What are the basic components of any communications system? Draw and explain the block diagram of the typical communication systems.
16.	With neat block diagram explain the working of basic digital communication system.
17.	With neat block diagram explain the working of digital TV system.
18.	With neat block diagram explain the working of satellite communication system.
19.	With neat block diagram explain the principle of operations of a mobile phone.
20.	Distinguish between analog and digital communication system.

NOTE: Sample problems are given in the question bank, more different problems may be expected refer the lesson plan