INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

COMPUTER SCIENCE AND ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	**Analog and Digital Electronics**
Course Code	:	**AECB05**
Class	:	**B. Tech III Semester**
Regulation	:	**IARE- R18**
Branch	:	**CSE**
Course Coordinator	:	**Ms. C Devi Supraja, Assistant Professor**
Course Faculty	:	**Ms. M Lavanya, Assistant Professor** **Ms. V Bindusree, Assistant Professor** **Ms. S Swathi, Assistant Professor**

COURSE OBJECTIVES:

The course should enable the students to,	
I	Introduce components such as diodes, BJTs and FETs.
II	Know the applications of components.
III	Understand common forms of number representation in logic circuits
IV	Learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
V	Understand the concepts of combinational logic circuits and sequential circuits.

COURSE OUTCOMES (CO's):

CO 1	Acquire knowledge of electrical characteristics of ideal and practical diodes under forward and reverse bias to analyze and design diode application circuits such as rectifiers.
CO 2	Utilize operational principles of bipolar to derive appropriate small-signal models and use them for the analysis of basic circuits.
CO 3	Understand the basic concept of number systems, Boolean algebra principles and minimization techniques for Boolean algebra
CO 4	Analyze Combination logic circuit such as multiplexers, adders, decoders
CO 5	Understand about synchronous and asynchronous sequential logic circuits.

COURSE LEARNING OUTCOMES (CLO's):

AECB05.01	Understand and analyze diodes operation and their characteristics in order to design basic form circuits
AECB05.02	Explain half wave rectifier for the given specifications.
AECB05.03	Design full wave rectifier for the given specifications
AECB05.04	Design rectifier with capacitive filter for the given specifications
AECB05.05	Understand the different parameters of transistors such as depletion width and channel width for understanding the functioning and design of this component.
AECB05.06	Estimate the performance of BJT on the basis of their operation and working.
AECB05.07	Explain the operation of Operating Point and Load Line Analysis
AECB05.08	Explain the operation of CB,CE,CC I/O Characteristics

AECB05.09	Understand the importance of h-parameter model
AECB05.10	Understand the basic concept of number systems, Binary addition and subtraction for digital systems.
AECB05.11	Explain the complements of Binary & Decimal number systems
AECB05.12	Discuss about digital logic gates, error detecting and Correcting codes for digital systems.
AECB05.13	Illustrate the switching algebra theorems and apply them for reduction of Boolean function.
AECB05.14	Identify the importance of SOP and POS canonical forms in the minimization or other optimization of Boolean formulas in general and digital circuits.
AECB05.15	Evaluate functions using various types of minimizing algorithms like Karnaugh map or tabulation method.
AECB05.16	Design Gate level minimization using KMaps and realize the Boolean function using logic gates.
AECB05.17	Analyze the design procedures of Combinational logic circuits like adders,Subtractors.
AECB05.18	Analyze the design of decoder, demultiplexer, and comparator using combinational logic circuit.
AECB05.19	Understand bi-stable elements like latches flip-flop and Illustrate the excitation tables of different flip flops
AECB05.20	Understand the concept of Shift Registers and implement the bidirectional and universal shift registers.
AECB05.21	Implement the synchronous& asynchronous counters using design procedure of sequential circuit and excitation tables of flip – flops.

TUTORIAL QUESTION BANK

MODULE-I DIODE AND APPLICATIONS				
Part – A (Short Answer Questions)				
S. No	**Question**	**Blooms Taxonomy Level**	**Course Outcomes**	**Course Learning Outcomes**
1	Explain about forward bias and reverse bias of diode?	Understand	CO 1	AECB05.01
2	Write the Applications of diode?	Understand	CO 1	AECB05.01
3	Draw the V-I characteristics of diode?	Understand	CO 1	AECB05.01
4	List the differences between ideal diode and practical diode?	Remember	CO 1	AECB05.01
5	Define diffusion and transition capacitance?	Remember	CO 1	AECB05.01
6	Define static and dynamic resistance?	Remember	CO 1	AECB05.01
7	Explain the load line Analysis of diode?	Understand	CO 1	AECB05.01
8	Define Fermi level?	Remember	CO 1	AECB05.01
9	Write the equation of diode current.	Remember	CO 1	AECB05.01
10	Define cut-in voltage?	Remember	CO 1	AECB05.01
11	Write the differences between avalanche and zener breakdown mechanisms?	Understand	CO 1	AECB05.01
12	Define depletion region?	Remember	CO 1	AECB05.01
13	Explain the temperature dependence of V-I characteristics of PN diode?	Understand	CO 1	AECB05.01
14	Define rectifier?	Remember	CO 1	AECB05.02
15	Give the advantages and disadvantages of HWR and FWR?	Understand	CO 1	AECB05.02
16	Define ripple factor and mention the ripple factor of HWR and FWR	Remember	CO 1	AECB05.03
17	Define transformer utilization factor and mention the TUF of HWR and FWR	Remember	CO 1	AECB05.03
18	Define efficiency and mention the efficiency of HWR and FWR.	Remember	CO 1	AECB05.03
19	Define drift and diffusion currents?	Remember	CO 1	AECB05.01
20	What is the need for a filter in rectifier?	Remember	CO 1	AECB05.04
Part – B (Long Answer Questions)				
1	Explain the formation of depletion region in an open-circuited p-n junction diode and also the effect of forward and reverse biasing of p-n junction on the depletion region with neat sketches?	Remember	CO 1	AECB05.01
2	Analyze the differences between drift and diffusion current in a semiconductor with neat diagrams?	Understand	CO 1	AECB05.01
3	Explain the operation of PN- junction diode under forward bias and reverse bias condition and Sketch the V-I characteristics of p-n junction diode.	Understand	CO 1	AECB05.01
4	Explain the temperature dependence of VI characteristics of PN diode?	Understand	CO 1	AECB05.01
5	Derive the diode current equation and discuss various parameters involved in the equation	Remember	CO 1	AECB05.01
6	Explain the Zener and avalanche breakdown mechanisms of p-n junction diode in detail?	Understand	CO 1	AECB05.01
7	Explain the switching functions of DIODE with a suitable wave forms.	Understand	CO 1	AECB05.01
8	Explain the differences between Static and dynamic resistances of a p – n diode.	Remember	CO 1	AECB05.01
9	Draw the circuit diagram of a half wave rectifier. Explain the operation of the circuit with relevant waveforms.	Remember	CO 1	AECB05.02
10	Define and derive the expressions for the following of a half wave rectifier with resistive load. i) Ripple factor ii) Peak inverse voltage iii) Efficiency iv) Average current v) RMS current vi) Transformer utilization factor	Remember	CO 1	AECB05.02

11	Draw the circuit diagrams of a full wave rectifier and Bridge rectifier. Explain the operation of the circuit with relevant waveforms.	Remember	CO 1	AECB05.03
12	Define and derive the expressions for the following of a full wave rectifier with resistive load. i) Ripple factor ii) Peak inverse voltage iii) Efficiency iv) Average current v) RMS current vi) Transformer utilization factor	Remember	CO 1	AECB05.03
13	Distinguish between Half wave rectifier, center tapped full wave rectifier and bridge rectifier	understand	CO 1	AECB05.03
14	Explain the operation of capacitor filter and derive expression for ripple factor?(HWR)	Understand	CO 1	AECB05.04
15	Explain the operation of C-section filter and derive expression for ripple factor?(FWR)	Understand	CO 1	AECB05.04
16	Discuss the merits and Demerits of half wave, full wave and bridge rectifier.	Remember	CO 1	AECB05.03
17	Explain the switching characteristics of diode with the help of simple diode circuit.	Remember	CO 1	AECB05.01
18	What is the ripple factor if a power supply of 220 V, 50 Hz is to be Full Wave rectified and filtered with a 220μF capacitor before delivering to a resistive load of 120Ω? Compute the value of the capacitor for the ripple factor to be less than 15%.	Remember	CO 1	AECB05.04
19	A bridge rectifier uses four identical diodes having forward resistance of 5Ω each. Transformer secondary resistance is 5Ω and the secondary voltage of 30V(rms).Determine the dc output voltage for IDC=200mA and the value of the ripple voltage.	Understand	CO 1	AECB05.03
20	A HWR circuit supplies 100mA DC current to a 250Ω load. Find the DC output voltage, PIV rating of a diode and the r.m.s. voltage for the transformer supplying the rectifier?	Remember	CO 1	AECB05.02
Part - C(Problem Solving And Critical Thinking Questions)				
1	Find the value of D.C. resistance and A.C resistance of a Germanium junction diode at 250^0 C with reverse saturation current, Io = 25μA and at an applied voltage of 0.2V across the diode?	Remember	CO 1	AECB05.01
2	The reverse saturation current of a silicon p – n function diode at an operating temperature of 270C is 50 nA. Estimate the dynamic forward and reverse resistances of the diode for applied voltages of 0.8 V and -0.4 V respectively?	Remember	CO 1	AECB05.01
3	Determine the values of forward current in the case of P-N junction diode, with I_0=10 μA Vf=0.8V at T=300^0K.Assume silicon diode?	understand	CO 1	AECB05.01
4	An Ideal Ge P-n junction diode has a reverse saturation current of 30 μA at a temperature of 125^0C.Find the dynamic resistance for a 0.2V bias in the forward and reverse direction	Understand	CO 1	AECB05.01
5	The voltage across a silicon diode at room temperature of 300K is 0.7 V when 2 ma current flows through it. If the voltage increases to 0.75 v, Evaluate the diode current assuming VT=26mv.	Understand	CO 1	AECB05.01

6	Determine the values of forward current in the case of P-N junction diode, with I0=10 µA Vf=0.8V at T=3000K.Assume silicon diode?	Remember	CO 1	AECB05.01
7	A p-n junction diode has a reverse saturation current of 30 µA at a temperature of 125^0 C. At the same temperature, find the dynamic resistance for 0.2 V bias in forward and reverse direction?	Remember	CO 1	AECB05.01
8	The voltage across a silicon diode at room temperature of 300^0K is 0.7 V when 2 ma current flows through it. If the voltage increases to 0.75 v, Evaluate the diode current assuming VT=26mv.	Remember	CO 1	AECB05.01
9	Determine the dynamic forward and reverse resistance of p-n junction silicon diode when the applied voltage is 0.25 V at T=3000K with give I0=2 µA?	Remember	CO 1	AECB05.01
10	A full wave bridge rectifier having load resistance of 100Ω is fed with 220V, Assuming the diodes are ideal, Find the following terms, i) DC output voltage ii) Peak inverse voltage iii) Rectifier efficiency.	understand	CO 1	AECB05.03
MODULE-II BIPOLAR JUNCTION TRANSISTOR (BJT)				
Part - A (Short Answer Questions)				
1	Define Transistor?	Remember	CO 2	AECB05.05
2	Define operating point Q?	Understand	CO 2	AECB05.06
3	Draw the symbols of NPN and PNP transistor and mark the current directions?	Understand	CO 2	AECB05.05
4	Draw the hybrid model of a CB configuration?	Remember	CO 2	AECB05.06
5	Explain the breakdown in transistor?	Understand	CO 2	AECB05.06
6	Explain the transistor switching times?	Understand	CO 2	AECB05.06
7	Explain the phenomena of reach through in a transistor.	Understand	CO 2	AECB05.07
8	Define early effect or base width modulation?	Remember	CO 2	AECB05.05
9	List the advantages of h- parameters	Understand	CO 2	AECB05.06
10	Explain about the various regions in a transistor?	Understand	CO 2	AECB05.06
11	When does a transistor act as a switch?	Understand	CO 2	AECB05.07
12	Draw the output characteristics of NPN transistor in CE Configuration?	Understand	CO 2	AECB05.06
13	Explain the criteria for fixing operating point	Understand	CO 2	AECB05.06
14	Describe the various current components in a BJT?	Remember	CO 2	AECB05.06
15	Write the relation between IC, β, IB and ICBO in a BJT?	Remember	CO 2	AECB05.06
16	Draw the circuit diagram of Common base, common emitter and common collector configurations	Understand	CO 2	AECB05.08
17	Draw the input characteristics of common emitter configuration.	Understand	CO 2	AECB05.08
18	Draw the small signal model of a CE configuration?	Understand	CO 2	AECB05.09
19	Define hie and hfe in CE configuration?	Remember	CO 2	AECB05.09
20	Define hoe and hre in CB configuration?	Understand	CO 2	AECB05.09
Part– B (Long Answer Questions)				
1	With a neat diagram explain the various current components in an NPN bipolar junction transistor and hence derive the general equation for collector current, IC.	Understand	CO 2	AECB05.05
2	Define Early-effect; Explain why it is called as base-width modulation? Discuss its consequences in transistors in detail?	Remember	CO 2	AECB05.06
3	What is thermal runaway in transistors? Obtain the condition for thermal stability in transistors?	Understand	CO 2	AECB05.06
4	Explain clearly the DC and AC load line and also explain how to obtain quiescent point graphically for a transistor amplifier of CE configuration.	Remember	CO 2	AECB05.07
5	Draw the input and output characteristics of a transistor in common emitter Configurations and explain its working?	Understand	CO 2	AECB05.08

6	Draw the input and output characteristics of a transistor in common base configurations?	Remember	CO 2	AECB05.08
7	Draw the input and output characteristic of a transistor in common collector configurations?	Understand	CO 2	AECB05.08
8	Describe the significance of the terms, α, β and γ and derive the relation between them?	Understand	CO 2	AECB05.06
9	Explain the constructional details and operation of Bipolar Junction Transistor with neat sketches?	Remember	CO 2	AECB05.05
12	Draw the small-signal model of common base BJT amplifier. Derive expressions for voltage gain, input resistance current gain and output resistance?	Understand	CO 2	AECB05.09
13	Draw the small-signal model of common collector BJT amplifier. Derive expressions for voltage gain, input resistance, current gain and output resistance?	Remember	CO 2	AECB05.09
14	Draw the small-signal model of common emitter BJT amplifier. Derive expressions for voltage gain, input resistance current gain and output resistance?	Understand	CO 2	AECB05.09
15	Derive the equations of current gain Ai, voltage gain Av , input impedance Zi , output admittance Yo , voltage gain with Rs(Avs), current gain with Rs(Ais) using a general two port active network.	Understand	CO 2	AECB05.09
16	Write the expression for collector current (IC) in terms of emitter current (IE) and αdc and in terms of base current (IB) and αdc	Understand	CO 2	AECB05.09
17	Draw the hybrid model of a CC configuration?	Remember	CO 2	AECB05.09
18	Define α, β, γ of a transistor and show how they are related to each other	Understand	CO 2	AECB05.09
19	Define following i) Active Region ii) Cut off region iii) Saturation region	Understand	CO 2	AECB05.07
20	What is the importance of DC load line	Remember	CO 2	AECB05.07
Part - C(Problem Solving And Critical Thinking Questions)				
1	A common collector circuit has the following components R1=27kΩ,R2=27kΩ, Re=5.6kΩ, RL=47kΩ, Rs=600Ω. The transistor parameters are hie=1kΩ, hfe=85 and hoe=2μA/V. Determine Ai, Ri, Av, Ro.	Understand	CO 2	AECB05.09
2	A common collector circuit has the following components R1=27kΩ,R2=27kΩ, Re=5.6kΩ, RL=47kΩ, Rs=600Ω. The transistor parameters are hie=1kΩ, hfe=85 and hoe=2μA/V. Determine Ai, Ri, Av, Ro.	Remember	CO 2	AECB05.09
3	A Common emitter circuit has the following components. Rs=1k, R1=110K, R2=12K Rc=6K. h-parameters are hie=1.2K,hre=2.5*10-4 ,hfe=75,hoe=25uA/V. Draw theequivalent hybrid model and calculate Ai, Ri, Ro and Av?	Understand	CO 2	AECB05.09
4	The h-parameters of a transistor used in a CE circuit are hie =1.0 K, hre=10×10−4, hfe = 50, hoe = 100 K. The load resistance for the transistor is 1 K in the collector circuit. Determine Ri, Ro, AV& Ai in the amplifier stage. (Assume Rs = 1000)?	Understand	CO 2	AECB05.09
5	Compute current gain, voltage gain, input and output impedance of the CB amplifier if it is driven by a voltage source of internal resistance Rs=1k.The load impedance is RL=1K. The transistor parameters are hib= 22, hfb= -0.98, hrb=2.9×10−4, hob= 0.5μA/V.	Remember	CO 2	AECB05.09
6	A bipolar junction transistor with hie = 1100Ω, hfe = 50, hre = 2.4x10-4, hoe = 25 μA/V, is to drive a load of 1KΩ in Emitter-Follower arrangement. Estimate AV, AI, Ri& R0?	Understand	CO 2	AECB05.09
7	Draw small signal equivalent circuit of Emitter Follower using accurate hparameter model. For the emitter follower	Understand	CO 2	AECB05.09

	circuit with RS= 0.5K and RL =5K, calculate Ri, AV and RO. Assume, hfe = 50, hie =1K, hoe = 25 μA/V.			
8	A silicon NPN transistor has Ico = 20nA and β=150, Vbe = 0.7V. It is operated in Common Emitter Configuration having Vbb = 4.5V, Rb=150K,Rc = 3K, Vcc = 12V. Find the emitter, base and collector currents and also verify in which region the transistor operates. What will happen if the value of the collector resistance is increased to very high values?	Understand	CO 2	AECB05.06
9	Draw small signal equivalent circuit of Emitter Follower using accurate hparameter model. For the emitter follower circuit with RS= 2K and RL =5K, calculate Ri, AV and RO. Assume, hfe = 50, hie =1K, hoe = 25 μA/V.	Understand	CO 2	AECB05.09
10	A common emitter circuit has the following components R1=27kΩ,R2=27kΩ, Re=5.6kΩ, RL=47kΩ, Rs=600Ω. The transistor parameters are hie=1kΩ, hfe=85 and hoe=2μA/V. Determine Ai, Ri, Av, Ro.	Understand	CO 2	AECB05.09
MODULE-III NUMBER SYSTEMS				
Part – A (Short Answer Questions)				
1	Write short notes on binary number systems.	Remember	CO 3	AECB05.10
2	Discuss 1"s and 2"s complement.	Understand	CO 3	AECB05.11
3	Discuss octal number system.	Understand	CO 3	AECB05.10
4	Convert the octal numbers into binary, decimal and Hexadecimal numbers (45.5)8, (32.2)8.	Understand	CO 3	AECB05.10
5	Show an example to convert gray code to binary code.	Remember	CO 3	AECB05.11
6	Describe a short note on four bit BCD codes.	Remember	CO 3	AECB05.11
7	Illustrate about unit –distance code? State where they are used.	Understand	CO 3	AECB05.11
8	List the applications of error correcting codes.	Remember	CO 3	AECB05.12
9	Convert 10101101.0111 to octal equivalent and hexadecimal equivalent.	Understand	CO 3	AECB05.10
10	Give the examples of unit distance codes	Understand	CO 3	AECB05.11
11	Convert $(4075)_8$ into base 5.	Understand	CO 3	AECB05.10
CIE II				
1	Which gates are called as universal gate justify.	Understand	CO 3	AECB05.12
2	State DeMorgan's theorem	Remember	CO 3	AECB05.13
3	State Duality theorem.	Remember	CO 3	AECB05.13
4	Draw the symbols and truth tables of XOR and XNOR gates	Remember	CO 3	AECB05.12
5	Define sum of products and product of sum	Remember	CO 3	AECB05.14
6	State and prove the distributive property of Boolean algebra.	Remember	CO 3	AECB05.13
7	Simplify ABC+AB'C+ABC'	Understand	CO 3	AECB05.12
8	Convert the given expression in standard SOP form Y= AC+AB+BC	Remember	CO 3	AECB05.14
9	Convert the given expression in standard POS form Y= (A+B)(B+C)(A+C).	Remember	CO 3	AECB05.14
Part – B (Long Answer Questions)				
1	Explain error occurred in data transmission can be detected using parity bit?	Understand	CO 3	AECB05.12
2	Define weighted codes and non weighted codes with examples?	Remember	CO 3	AECB05.11
3	Explain what do you mean by error detection and correcting code with examples.	Understand	CO 3	AECB05.12
4	Explain the gray to binary and binary- to- gray conversion with examples	Understand	CO 3	AECB05.11
5	Explain the conversion of AND/OR/NOT logic to NAND/ NOR logic with example.	Understand	CO 3	AECB05.14
6	Explain Self complemented codes.	Understand	CO 3	AECB05.11
7	Differentiate between BCD code and 2421 code and XS-3.	Understand	CO 3	AECB05.11

8	Given the 8bit data word 01011011, generate the 12 bit composite word for the hamming code that corrects and detects single errors.	Understand	CO 3	AECB05.12
9	Write the first 10 decimal digits in base 3 and base 16.	Remember	CO 3	AECB05.10
10	A device transmits the binary data using even parity, the message is 1011001. Identify the receiver receives the correct data or not.	Remember	CO 3	AECB05.12
11	Convert the given expression in standard POS form Y= (A+B)(B+C)(A+C).	Remember	CO 3	AECB05.14
12	Obtain the canonical SOP form of the following functions. i) Y(A,B) = A+B. ii) Y(A,B,C,D) = AB+ACD	Understand	CO 3	AECB05.10
13	Simplify the expression Z= AB+AB'. (A'C')'	Remember	CO 3	AECB05.10
14	Simplify the following 3 variable expression using Boolean algebra Y= ∏M(3,5,7).	Remember	CO 3	AECB05.10
15	Simplify the following 3 variable expression using Boolean algebra Y= ∑m(1,3,5,7).	Understand	CO 3	AECB05.10
CIE –II				
1	Give the Boolean expressions, symbols and truth tables for following gates, i) AND ii) NOR iii) EX-OR iv) OR v) EX-NOR.	Understand	CO 3	AECB05.12
2	Realize all the logic gates using NAND gate.	Remember	CO 3	AECB05.14
3	Realize all the logic gates using NOR gate.	Remember	CO 3	AECB05.12
4	Explain standard SOP and POS forms with examples	Remember	CO 3	AECB05.14
5	State and prove Boolean theorems and properties.	Understand	CO 3	AECB05.13
Part - C (Problem Solving And Critical Thinking Questions)				
1	Convert the following Hexadecimal number to their Decimal equivalent (EAF1)16.	Remember	CO 3	AECB05.10
2	What is the gray code equivalent of the Hex Number 3A7. Find 9's complement of (25.639)10.	Remember	CO 3	AECB05.10
3	Find 7 bit hamming code for given message 1010 by using odd parity.	Understand	CO 3	AECB05.12
4	Perform the subtraction using 1's complement and 2's Complement i) $(11010)_2 - (10000)_2$ ii) $(1000100)_2 - (1010100)_2$	Remember	CO 3	AECB05.11
5	Convert following hexadecimal number to decimal, i) F2816 ii) BC216	Understand	CO 3	AECB05.11
CIE-II				
1	Implement Y= Y= AB'+A' B using 2 input NAND gates	Remember	CO 3	AECB05.14
2	Simplify using postulates and theorems of Boolean algebra i) (X+Y'+XY)(X+Y')X'Y ii) (AB+C+D)(C'+D)(C'+D+E)	Remember	CO 3	AECB05.13
3	For each of the following expressions, construct the corresponding logic circuit using AND/OR/INVERT logic. i) Y=AB(C+D) ii) Z= (W+PQ')'	Remember	CO 3	AECB05.13
4	Implement Y= AB'+A' B using 2 input NOR gates	Understand	CO 3	AECB05.14
5	Realize X-OR operation a)NAND gate b)NOR gate	Remember	CO 3	AECB05.12
MODULE-IV MINIMIZATION OF BOOLEAN FUNCTIONS				
Part – A (Short Answer Questions)				
1	Realize 16 × 1 Mux using only 2 × 1 Mux	Understand	CO 4	AECB05.18
2	Design logic circuit for parity bit generator	Remember	CO 4	AECB05.18
3	What is decoder? How do you convert a decoder in to a De-Multiplexer	Understand	CO 4	AECB05.18
4	Design BCD to gray code converter and realize using logic gates.	Understand	CO 4	AECB05.18
5	What is K-Map and State the limitations of karnaugh map.	Remember	CO 4	AECB05.15
6	What do you mean by adder circuit?	Understand	CO 4	AECB05.17

7	State the truth table for 1 bit half adder.	Remember	CO 4	AECB05.17
8	Design a logic circuit to convert BCD and gray code.	Understand	CO 4	AECB05.18
9	Design Full adder using Logic Gates.	Remember	CO 4	AECB05.17
10	Design Half subtractor using NAND Gates.	Understand	CO 4	AECB05.17
11	Design a Full adder using NOR Gates.	Remember	CO 4	AECB05.17
12	Design Half subtractor using NOR Gates	Understand	CO 4	AECB05.17
13	Design a Full subtractor using NAND Gates.	Remember	CO 4	AECB05.17
14	Design a Full subtractor using NOR Gates.	Understand	CO 4	AECB05.17
15	State the truth table for 1 bit full adder.	Remember	CO 4	AECB05.17
16	Design a Full adder using NAND Gates.	Remember	CO 4	AECB05.17
17	How do you compare serial adder and parallel adder	Remember	CO 4	AECB05.17
18	Explain the terms multiplexer and de multiplexer	Remember	CO 4	AECB05.17
19	List some of the applications of multiplexer and de multiplexer	Remember	CO 4	AECB05.17
20	Explain about ripple carry adder	Remember	CO 4	AECB05.17
Part – B (Long Answer Questions)				
1	Design 4 bit parallel adder using full adders. Remember	Understand	CO 4	AECB05.17
2	Design a excess-3 adder using 4-bit parallel binary adder and logic gates. B) What are the applications of full adders?	Remember	CO 4	AECB05.17
3	Explain the operation of 4 to 16 decoder.	Understand	CO 4	AECB05.18
4	Explain the differences between multiplexers and De-multiplexers with the help of neat logic diagrams.	Remember	CO 4	AECB05.18
5	Design a 64:1 MUX using 8:1 MUXs.	Understand	CO 4	AECB05.18
6	Design a 4 bit parallel adder using Full adder modules.	Remember	CO 4	AECB05.17
7	Implement the given function in 4:1 mux f= Σm(0,1,3,5,6)	Understand	CO 4	AECB05.18
8	Design a full adder using two half adders and OR gate.	Remember	CO 4	AECB05.17
9	Design a 4-bit Binary Adder using full adder.	Understand	CO 4	AECB05.17
10	Design a combinational circuit that generates the 9"s complement of BCD digit	Remember	CO 4	AECB05.18
11	Design a combinational circuit that generates logic „1" for odd inputs.	Understand	CO 4	AECB05.18
12	Explain the working of carry look-ahead generator.	Remember	CO 4	AECB05.17
13	Explain the design procedure for code converter with the help of example	Understand	CO 4	AECB05.18
14	Design a logic circuit to convert gray code to binary code.	Remember	CO 4	AECB05.18
15	Design a logic circuit to convert binary code to gray code.	Understand	CO 4	AECB05.18
16	Design a logic circuit to convert BCD code to binary code.	Remember	CO 4	AECB05.18
17	Realize the Boolean expression for half subtractor.		CO 4	AECB05.17
18	Design a combinatorial circuit that accepts a three bit number and generates an output Binary number equal to the cube of the given input number.	Remember	CO 4	AECB05.18
19	Implement the circuit to produce the octal number for given 4 bit binary number.	Understand	CO 4	AECB05.18
20	Design an 8424 to 2421 BCD code converter and draw its logic diagram.	Understand	CO 4	AECB05.18
Part – C (Problem Solving And Critical Thinking Questions)				
1	F(w,x,y,z) = ∑m (1,4,5,6,7,9,14,15) Realize using De-Multiplexer	Remember	CO 4	AECB05.18
2	Design a 4-bit Combinational circuit which generates the output as 2"s complement of input binary number.	Understand	CO 4	AECB05.18
3	Simplify the following Boolean expressions using K-map and implement it by using NOR gates. A) F(A,B,C,D)=AB'C' +AC+A'CD' b)F(W,X,Y,Z)=w' x'y'z' + wxy'z' + w'x'yz + wxyz	Understand	CO 4	AECB05.16
4	Simplify the following using Tabular method. F(A,B,C,D) = ∑(1,5,6,12,13,14)+ d∑ (2,4) ∑m(1,2,3,5,9,12,14,15)+d(4,8,11)	Remember	CO 4	AECB05.16
5	Design a combinatorial circuit that converts a decimal digit from 2,4,2,1 code to the 8,4,2,1 code?	Understand	CO 4	AECB05.18
6	Design a combinatorial circuit that accepts a three bit number	Remember	CO 4	AECB05.18

	and generates an output Binary number equal to the square of the input number.			
7	4 Design a 4-bit Combinational circuit which generates the output as 1"s complement of input binary number.	Understand	CO 4	AECB05.18
8	Construct and explain the working of decimal adder.	Remember	CO 4	AECB05.17
9	Realize the Boolean expression for full subtractor.	Understand	CO 4	AECB05.17
10	Design half adder using AND & OR gates.	Remember	CO 4	AECB05.17
MODULE-V SEQUENTIAL CIRCUITS FUNDAMENTALS				
Part – A (Short Answer Questions)				
1.	Differentiate combinational and sequential logic circuits?	Understand	CO 5	AECB05.19
2.	Explain basic difference between a shift register and counter?	Understand	CO 5	AECB05.20
3.	Illustrate applications of shift registers?	Remember	CO 5	AECB05.20
4.	Define bidirectional shift register?	Remember	CO 5	AECB05.20
5.	Differentiate Flip-flop and latch?	Analysis	CO 5	AECB05.19
6.	Define Counter?	Remember	CO 5	AECB05.21
7.	Classify the basic types of counters?	Understand	CO 5	AECB05.21
8.	Differentiate the advantages and disadvantages of ripple counters?	Understand	CO 5	AECB05.21
9	Describe the applications of counters?	Understand	CO 5	AECB05.21
10	Design D-latch using NAND?	Understand	CO 5	AECB05.19
11	Design and explain gated latch logic diagram?	Understand	CO 5	AECB05.19
12	Define race around condition? How it can be avoided?	Remember	CO 5	AECB05.19
13	Convert the following JK Flip Flop to using, i) SR ii) T iii) D	Understand	CO 5	AECB05.21
14	Convert the following SR Flip-Flop to using, i) JK ii) D iii) T	Remember	CO 5	AECB05.21
15	Explain what is a synchronous latch?	Remember	CO 5	AECB05.19
16	Construct a latch using universal gates?	Understand	CO 5	AECB05.19
17	Explain what do you mean a stable state?	Remember	CO 5	AECB05.21
18	Define a Flip-Flop?	Remember	CO 5	AECB05.19
19	Define applications of Flip-Flops?	Remember	CO 5	AECB05.19
20	Explain what is meant by clocked flip-flop?	Understand	CO 5	AECB05.19
Part – B (Long Answer Questions)				
1	Explain the design of Synchronous Sequential circuit with an example?	Understand	CO 5	AECB05.21
2	Write short notes on shift register? Mention its application along with the Serial Transfer in 4-bit shift Registers?	Remember	CO 5	AECB05.20
3	Explain about Binary Ripple Counter? What is MOD counter?	Understand	CO 5	AECB05.21
4	How do you convert Jk- Flip Flop to SR- Flip Flop	Remember	CO 5	AECB05.21
5	How do you convert T- Flip Flop to SR- Flip Flop	Understand	CO 5	AECB05.21
6	How do you convert D- Flip Flop to T- Flip Flop	Understand	CO 5	AECB05.21
7	Design a Modulo-12 up Synchronous counters using T-Flip Flops and draw the Circuit diagram for synchronous mod-12 counter?	Understand	CO 5	AECB05.21
8	Explain the Ripple counter design. Also the decade counters design?	Understand	CO 5	AECB05.21
9	Design a 3 bit ring counter? Discuss how ring counters differ from twisted ring counter?	Understand	CO 5	AECB05.21
10	Design a Johnson counter?	Understand	CO 5	AECB05.21
11	Design Johnson ounters and state its advantages and Disadvantages?	Understand	CO 5	AECB05.21
12	Explain with the help of a block diagram, the basic components of a Sequential Circuit?	Understand	CO 5	AECB05.19

13	Explain about RS and JK flip-flops with functional diagram and Truth tables?	Understand	CO 5	AECB05.19
14	Define T – Flip-flop with the help of a logic diagram and characteristic table?	Remember	CO 5	AECB05.19
15	Define Latch. Explain about SR-Latch using NAND and NOR gates.	Remember	CO 5	AECB05.19
16	Construct the transition table for the following flip-flops SRFF, DFF	Remember	CO 5	AECB05.21
17	Differentiate Synchronous and Asynchronous counters?	Remember	CO 5	AECB05.21
18	What do you mean by a) latch b) gated latch.	Remember	CO 5	AECB05.21
19	Differentiate between gated SR- latch and edge triggered SR-Flip Flop.	Remember	CO 5	AECB05.21
20	How do you convert Jk- Flip Flop to D- Flip Flop	Remember	CO 5	AECB05.21
Part - C (Problem Solving And Critical Thinking Questions)				
1	Explain the JK and Master slave Flip-flop? Give its timing waveform?	Understand	CO 5	AECB05.21
2	Define JK – Flip-flop with the help of a logic diagram and characteristic table?	Remember	CO 5	AECB05.19
3	Design and implement 4-bit binary counter (using D flip flops) which counts all possible odd numbers only?	Understand	CO 5	AECB05.21
4	List the characteristic equations for RS,JK,T and data Flip-Flops?	Remember	CO 5	AECB05.19
5	Describe the steps involved in design of asynchronous sequential circuit in detail with an example?	Understand	CO 5	AECB05.21
6	Design a MOD-5 synchronous counter using flip flops and Implement it? Also draw the timing diagram?	Understand	CO 5	AECB05.21
7	Design a Ring counter using JK flip-flop?	Remember	CO 5	AECB05.21
8	Design a Twisted Ring counter using JK flip-flop?	Remember	CO 5	AECB05.21
9	Design MOD5 up and Down counter?	Remember	CO 5	AECB05.21
10	How do you convert Jk- Flip Flop to T- Flip Flop	Remember	CO 5	AECB05.21

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