INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad-500 043

CIVIL ENGINEERING

Course Name	:	**BASIC ELECTRONICS ENGINEERING**
Course Code	:	AECB01
Program	:	B.Tech
Semester	:	III
Branch	:	Civil Engineering
Section	:	A, B
Course Faculty	:	Mr. P Sandeep Kumar, Assistant Professor Mr. B Santhosh Kumar, 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	Be acquainted to principles and characteristics of op-amp and apply the techniques for the design of comparators, instrumentation amplifier, integrator, differentiator.

COURSE OUTCOMES (COs):

CO 1	Describe the concept of diode and its applications.
CO 2	Describe the operation of various transistors, FETs and their biasing methods.
CO 3	Understand the concept of operational amplifier with analysis of applications.
CO 4	Analysis of 555 timer IC for multivibrators and op-amp data converters.
CO 5	Explore the digital number systems and various digital logic circuits.

COURSE LEARNING OUTCOMES (CLOs):

AECB01.01	Understand the basic concept of PN junction diode.
AECB01.02	Analyze the characteristics of diode for ideal and practical conditions.
AECB01.03	Understand the applications of diode in rectifiers with and without filters.
AECB01.04	Understand the concept of breakdown mechanism in diodes with applications of Zener breakdown diodes.
AECB01.05	Describe the classification family table of various transistors.
AECB01.06	Describe the concept of Bipolar Junction transistor with various modes of operation.
AECB01.07	Understand the concept of transistor biasing with voltage divider bias.
AECB01.08	Understand the construction and working of Field Effect Transistor(FET).
AECB01.09	Understand the concept of Metal Oxide Semiconductor FET.
AECB01.10	Illustrate the basic CMOS circuits.
AECB01.11	Understand the basic concepts of operational amplifiers.

AECB01.12	Analyze the parameters of practical and ideal op-amps.
AECB01.13	Understand the concept of virtual ground in op-amps.
AECB01.14	Perform basic arithmetic operations on voltages using opamps.
AECB01.15	Examine the working of op-amp as differentiator, integrator, comparator and buffer.
AECB01.16	Understand the internal block diagram of 555 timer IC.
AECB01.17	Examine the working of 555 timer as astable and monostablemultivibrator.
AECB01.18	Understand the principle of data conversions with terminology.
AECB01.19	Analyze the A/D converters.
AECB01.20	Analyze the resistor ladder D/A converters.
AECB01.21	Perform calculations in different number systems.
AECB01.22	Understand the basic concepts of Boolean algebra and combinational logic circuits.
AECB01.23	Understand the basic sequential logic circuits.
AECB01.24	Understand counters, registers.

TUTORIAL QUESTION BANK

MODULE –I DIODE AND APPLICATIONS				
PART – A (SHORT ANSWER QUESTIONS)				
S No	**Question**	**Blooms Taxonomy Level**	**Course Outcomes**	**Course Learning Outcomes (CLOS)**
1	What is static resistance of diode?	Remember	CO 1	AECB01.02
2	Explain about forward-bias of diode.	Understand	CO 1	AECB01.01
3	Explain about reverse bias of diode?	Understand	CO 1	AECB01.01
4	Write the Applications of diode?	Understand	CO 1	AECB01.02
5	Draw the V-I characteristics of diode?	Understand	CO 1	AECB01.02
6	List the differences between ideal diode and practical diode?	Remember	CO 1	AECB01.02
7	Define dynamic resistance?	Remember	CO 1	AECB01.02
8	Explain the load line Analysis of diode?	Understand	CO 1	AECB01.02
9	Write the equation of diode current.	Remember	CO 1	AECB01.02
10	Define cut-in voltage?	Remember	CO 1	AECB01.02
11	What is avalanche breakdown?	Understand	CO 1	AECB01.04
12	Define depletion region?	Remember	CO 1	AECB01.01
13	List the applications of Zener diode?	Remember	CO 1	AECB01.04
14	Define zener breakdown mechanism?	Remember	CO 1	AECB01.04
15	Sketch V-I characteristics of a PN diode for the following conditions: Rf=0,Rr = 0, Vγ =0	Remember	CO 1	AECB01.02
16	What is zener regulator?	Understand	CO 1	AECB01.04
17	What is half wave rectifier?	Remember	CO 1	AECB01.03
18	What is ripple factor?	Understand	CO 1	AECB01.03
19	What is use of capacitor filter in rectifier?	Understand	CO 1	AECB01.04
20	What is full wave rectifier?	Understand	CO 1	AECB01.03
PART – B (LONG ANSWER QUESTIONS)				
1	Sketch the V-I characteristics of p-n junction diode for forward bias voltages. Analyze between the incremental resistance and the apparent resistance of the diode?	Understand	CO 1	AECB01.02
2	What is potential barrier in a pn junction? How does it arise in a pn junction? Explain.	Understand	CO 1	AECB01.01
3	What is reverse saturation current and explain its relevance in pn junction diode?	Understand	CO 1	AECB01.02
4	With neat diagram explain the working of a half wave rectifier.	Understand	CO 1	AECB01.03
5	Explain the significance of introducing a capacitor filter in rectifiers?	Understand	CO 1	AECB01.04
6	Explain how diode is used as a switch.	Understand	CO 1	AECB01.02
7	Explain the difference between the outputs of half wave	Understand	CO 1	AECB01.03

	rectifier with C-filter and full wave rectifier with C-filter?			
8	Explain the terms ripple, ripple factor, efficiency, dc voltage and dc current with respect to a full wave rectifier with C-filter?	Understand	CO 1	AECB01.03
9	What is reverse recovery time and explain the switching characteristics of a diode?	Understand	CO 1	AECB01.02
10	Explain how a zener diode is used a regulator?	Understand	CO 1	AECB01.04
11	Describe in your own words the characteristics of the ideal diode and how they determine the on and off states of the device.	Understand	CO 1	AECB01.02
12	What is Peak Inverse Voltage (PIV) and explain how it is different in full wave rectifier to that from half wave rectifier?	Understand	CO 1	AECB01.03
13	Explain with neat sketches how avalanche breakdown occurs in a pn diode.	Understand	CO 1	AECB01.04
14	Describe the difference between n -type and p -type semiconductor materials.	Understand	CO 1	AECB01.01
15	Explain the working of a full wave rectifier with its circuit diagram.	Understand	CO 1	AECB01.03
16	Explain Breakdown mechanism.	Understand	CO 1	AECB01.03
17	What is diode equivalent circuit explain with one example.	Understand	CO 1	AECB01.03
18	Explain avalanche breakdown.	Understand	CO 1	AECB01.04
19	Explain halfwave rectifier with and without filters	Understand	CO 1	AECB01.03
20	Explain fullwave rectifier with and without filters	Understand	CO 1	AECB01.03
PART-C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)				
1	A full wave 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	AECB01.03
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?	Understand	CO 1	AECB01.02
3	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%.	Understand	CO 1	AECB01.03
4	0.10 μA at the room temperature of 270C.It is observed to be 30μA, when the room temperature is increased. Evaluate the room temperature?	Understand	CO 1	AECB01.02
5	Find the factor by which the reverse saturation current of a silicon diode will get multiplied when the temperature is increased from 2700 C to 8200 C?	Remember	CO 1	AECB01.02
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?	Understand	CO 1	AECB01.01
7	A p-n junction diode has a reverse saturation	Remember	CO 1	AECB01.02

	current of 30 µA a at temperature of 12500 C. At the same temperature, find the dynamic resistance for 0.2 V bias in forward and reverse direction?			
8	The voltage across a silicon diode at room temperature of 3000K is 0.7 V when 2 ma current flows through it. If the voltage increases to0.75 v, Evaluate the diode current assuming VT=26mv.	Understand	CO 1	AECB01.02
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?	Understand	CO 1	AECB01.01
10	Determine the ripple factor of fullwave rectifier with example	Understand	CO 1	AECB01.03
MODULE-II BIPOLARJUNCTIONTRANSISTOR(BJT)				
PART – A (SHORT ANSWER QUESTIONS)				
1	Define Transistor?	Remember	CO 2	AECB01.05
2	Define operating point Q?	Understand	CO 2	AECB01.05
3	Draw the symbols of NPN and PNP transistor?	Understand	CO 2	AECB01.05
4	Explain the operation of BJT and its types?	Understand	CO 2	AECB01.06
5	Explain the breakdown in transistor?	Understand	CO 2	AECB01.05
6	Explain about the various regions in a transistor?	Understand	CO 2	AECB01.05
7	Draw the output characteristics of NPN transistor in CE configuration?	Remember	CO 2	AECB01.07
8	Define saturation region?	Understand	CO 2	AECB01.07
9	Write the relation between IC, β, IB and ICBO in a BJT? Remember	Understand	CO 2	AECB01.07
10	Write the relation between IC, β, IB and ICBO in a BJT?	Understand	CO 2	AECB01.07
11	Why biasing is necessary in BJT amplifiers?	Understand	CO 2	AECB01.06
12	Draw the circuit diagram of a fixed bias circuit of CE amplifier?	Remember	CO 2	AECB01.07
13	Draw the circuit diagram of a self-bias circuit of CE amplifier?	Remember	CO 2	AECB01.07
14	Draw the small signal model of JFET?	Remember	CO 2	AECB01.08
15	Define hie and hfe in CE configuration?	Remember	CO 2	AECB01.07
16	Define hoe and hre in CB configuration?	Understand	CO 2	AECB01.07
17	Define Q-point?	Understand	CO 2	AECB01.05
18	Explain the concept of dc load line with the help of neat diagram?	Understand	CO 2	AECB01.06
19	Draw and explain the ac load line?	Understand	CO 2	AECB01.07
20	Compare CE,CC and CB configurations	Remember	CO 2	AECB01.07
PART – B (LONG ANSWER QUESTIONS)				
1	Write a note on transistor construction?	Understand	CO 2	AECB01.01
2	Why FET is called a voltage operated device?	Understand	CO 2	AECB01.08
3	Explain about transistor amplifier?	Remember	CO 2	AECB01.01

4	List the important features of FET?	Remember	CO 2	AECB01.08
5	Draw the functional diagram of JFET?	Remember	CO 2	AECB01.08
6	Give the classifications of FETs and their Apply areas?	Remember	CO 2	AECB01.08
7	Draw the small-signal model of common emitter BJT amplifier. Derive expressions for voltage gain, input resistance and output resistance?	Understand	CO 2	AECB01.06
8	Draw the small-signal model of common collector BJT amplifier. Derive expressions for voltage gain, input resistance and output	Understand	CO 2	AECB01.06
9	Draw the small-signal model of common base BJT amplifier. Derive expressions for voltage gain, input resistance and output	Understand	CO 2	AECB01.06
10	List out the differences between BJT and FET.	Understand	CO 2	AECB01.07
11	Explain the construction and working of n-channel FET	Understand	CO 2	AECB01.07
12	Explain the construction and working of p-channel FET	Understand	CO 2	AECB01.07
13	Explain how FET behaves as a voltage variable resistor.	Understand	CO 2	AECB01.07
14	Explain the drain characteristics of FET.	Understand	CO 2	AECB01.07
15	Write a short note on CMOS.	Understand	CO 2	AECB01.07
16	Explain about depletion mode in FET	Understand	CO 2	AECB01.07
17	What is pinchoff voltage and discuss about drain current equation.	Understand	CO 2	AECB01.07
18	Explain why FET is called voltage control device.	Understand	CO 2	AECB01.07
19	Explain about the classification of transistors	Understand	CO 2	AECB01.07
20	Explain about the enhancement mode of MOSFET	Understand	CO 2	AECB01.09
PART-C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)				
1	Determine the collector current and emitter current for a transistor with $\alpha = 0.99$ and ICBO = 490μA when the base current is 19μA?	Understand	CO 2	AECB01.05
2	The reverse leakage current of the transistor when connected in CB configuration is 0.2 μA while it is 18 μA when the same transistor is connected in CE configuration. Determine α and β of the transistor?	Understand	CO 2	AECB01.06
3	Design a collector to base bias circuit using silicon transistor to achieve a stability factor of 20, with the following specifications: VCC = 16V, VBE = 0.7V, VCEQ = 8V,Icq=4mA & β=50?	Understand	CO 2	AECB01.06
4	The P-channel FET has a |IDS|=-12mA, |Vp|=5V, VGS is 1.6 V. Determine ID, gm and gm0 ?	Understand	CO 2	AECB01.08
5	A Common Source FET amplifier circuit shown in Figure.2 with un bypassedRS has the following circuit parameters: Rd = 15K, RS = 0.5K, Rg =1M,,rd = 5K, gm= 5mS and VDD = 20 V. Calculate AV, AI, Ri and R0?	Understand	CO 2	AECB01.08
6	If the base current in a transistor is 20μA when the	Understand	CO 2	AECB01.06

	emitter current is 6.4mA, what are the values of αdc and βdc? Also determine the collector current?			
7	Design a self-bias circuit for the following specifications: VCC= 12 V; VCE =2v; Ic=4mA;hfe=80. Assume any other design parameters required. Draw the designed circuit.	Understand	CO 2	AECB01.06
8	The P-channel FET has a |IDS|=-12mA, |Vp|=5V, VGS is 1.6 V. Determine ID, gm and gm0 ?	Understand	CO 2	AECB01.08
9	Draw the circuit diagram of a voltage divider bias and derive expression for Stability factor.	Remember	CO 2	AECB01.08
10	Draw the circuit diagram of a fixed bias and derive expression for Stability factor.	Remember	CO 2	AECB01.08
MODULE-III OPERATIONAL AMPLIFIERS AND APPLICATIONS				
PART – A (SHORT ANSWER QUESTIONS)				
1	List the applications of IC741?	Remember	CO 3	AECB01.14
2	Draw the circuit diagram of integrator?	Remember	CO 3	AECB01.15
3	Define voltage follower?	Understand	CO 3	AECB01.12
4	Give the applications of comparator?	Remember	CO 3	AECB01.15
5	Draw the circuit diagram of differentiator?	Remember	CO 3	AECB01.15
6	What is differential amplifier?	Remember	CO 3	AECB01.11
7	What do you mean by summing amplifier?	Understand	CO 3	AECB01.11
8	Draw the diagram of inverting adder?	Remember	CO 3	AECB01.14
9	How op-amps can be used to subtract the two input voltages?	Remember	CO 3	AECB01.14
10	What are the applications of log amplifier?	Understand	CO 3	AECB01.14
11	What are the applications of inverting amplifier?	Remember	CO 3	AECB01.14
12	What are the limitations of differentiator?	Understand	CO 3	AECB01.15
13	Give the applications of anti-log amplifier?	Remember	CO 3	AECB01.13
14	What are the limitations of integrator?	Understand	CO 3	AECB01.15
15	Explain why integrators are preferred over differentiators in analog	Remember	CO 3	AECB01.15
16	What are the characteristics of Ideal OpAmp	Remember	CO 3	AECB01.15
17	What is virtual ground with respect to inverting amplifier.	Remember	CO 3	AECB01.15
18	What are the voltage gain of inverting and non inverting amplifier with feedback.	Remember	CO 3	AECB01.16
19	What happens when square wave is given to integrator circuit?	Remember	CO 3	AECB01.17
20	Draw the circuit diagram of integrator?	Remember	CO 3	AECB01.17
PART – B (LONG ANSWER QUESTIONS)				
1	Explain the Characteristics of Ideal OpAmp ?	Remember	CO 3	AECB01.11

2	Derive the gain expression for inverting operational amplifier and non inverting operational amplifier.	Understand	CO 3	AECB01.12
3	With circuit and waveforms explain the application of OPAMP as Differentiator and write the advantages of practical differentiator	Understand	CO 3	AECB01.15
4	List and compare ideal and practical characteristics of an operational amplifier circuit.	Understand	CO 3	AECB01.13
5	Draw the circuit of a log amplifier using two op-amps and explain its operation?	Remember	CO 3	AECB01.13
6	Draw and explain the operation of sine wave generator using necessary equations.	Remember	CO 3	AECB01.13
7	Explain practical integrator circuit using IC 741 and list the advantages of practical integrator over ideal integrator.	Understand	CO 3	AECB01.15
8	Explain the operation of AC amplifier and list the differences between AC & DC amplifiers?	Understand	CO 3	AECB01.13
9	What are the limitations of an ordinary op-amp differentiator?	Remember	CO 3	AECB01.15
10	Draw the circuit of a practical differentiator that will eliminate these limitations?	Remember	CO 3	AECB01.15
11	Explain the difference between the integrator and differentiator and give one application of each?	Understand	CO 3	AECB01.15
12	Explain the use of constant current bias method for Dual input balanced output differential amplifier	Understand	CO 3	AECB01.15
13	Derive the output voltage of an op-amp based differential amplifier.	Understand	CO 3	AECB01.16
14	Discuss the differences between inverting operational amplifier and non inverting operational amplifier.	Understand	CO 3	AECB01.15
15	Define stability. Discuss the stability of operational amplifier with neat circuit diagrams.	Understand	CO 3	AECB01.15
16	Explain the concept of Virtual Ground with neat circuit diagram	Understand	CO 3	AECB01.17
17	Explain the concept of Slew Rate with neat diagram	Understand	CO 3	AECB01.16
18	Explain the Voltage Follower with neat diagram	Understand	CO 3	AECB01.17
19	Draw and explain Pin Configuration of 741 Op-Amp	Understand	CO 3	AECB01.15
20	What is the instrumentation amplifier? What are the required parameters of an instrumentation amplifier? Explain the working of instrumentation amplifier with neat circuit diagram	Understand	CO 3	AECB01.14
PART-C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)				
1	Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to about 1 KHz. If a sine wave of 1V peak at 1000 Hz is applied to this differentiator draw the output waveforms.	Remember	CO 3	AECB01.15
2	Draw the output waveform for a sine wave of 1V peak at 100Hz applied to the differentiator	Remember	CO 3	AECB01.15
3	Design an op-amp differentiator that will differentiate an Input signal with fmax = 100Hz.	Remember	CO 3	AECB01.15

4	Find R1 and Rf in the lossy integrator so that the peak gain is 20dB and the gain is 3dB down from its peak when ω = 10,000 rad/sec. use a capacitance of 0.01micro farads.	Remember	CO 3	AECB01.15
5	Design a comparator circuit for input voltage = 2Vpp sine wave at 1KHz, Vref=500mV, R=100Ω, and supply voltage= ±15V.Draw the output waveform	Remember	CO 3	AECB01.15
6	For a non inverting single supply AC amplifier Rin=50 Ω, Ci=0.1μF, C1=0.1μF, R1=R2=R3=100K Ω, Rf= 1M Ω and VCC= +12 V. Determine the bandwidth of the amplifier and maximum voltage swing	Remember	CO 3	AECB01.13
7	The input signal to an op-amp is 0.03sin(1.5×105)t. calculate maximum gain of an op-amp with the slew rate of 0.4V/μ sec.	Understand	CO 3	AECB01.15
8	Analyze the dual input balanced output configuration of Differential amplifier circuit.	Understand	CO 3	AECB01.15
9	Define stability. Discuss the stability of operational amplifier with neat circuit diagrams..	Remember	CO 3	AECB01.15
10	Describe the following terms in an OP-AMP. 1. Input Bias current 2. Input offset voltage 3. Input offset current	Remember	CO 3	AECB01.14
MODULE-IV TIMERS AND DATACONVERTERS				
PART – A (SHORT ANSWER QUESTIONS)				
1	List the applications of 555 timer in Monostable mode of operation	Remember	CO 4	AECB01.16
2	Give the pin configuration of 555 IC?	Understand	CO 4	AECB01.16
3	What are the applications of Monostablemultivibrator?	Remember	CO 4	AECB01.17
4	What are the applications of Astablemultivibrator?	Remember	CO 4	AECB01.17
5	Define duty cycle?	Remember	CO 4	AECB01.18
6	Illustrate the need of data converters	Understand	CO 4	AECB01.18
7	Illustrate the different type of DAC techniques.	Understand	CO 4	AECB01.18
8	Give applications of data converters	Remember	CO 4	AECB01.18
9	Give the drawbacks of weighted resistor type DAC.	Remember	CO 4	AECB01.20
10	Give the advantages of weighted resistor type DAC.	Remember	CO 4	AECB01.20
11	Define off set error in DAC.	Remember	CO 4	AECB01.20
12	What are the main advantages of integrating type ADCs?	Remember	CO 4	AECB01.19
13	Define linearity error in DAC	Remember	CO 4	AECB01.20
14	Define resolution in DAC.	Remember	CO 4	AECB01.20
15	List out the direct type ADCs	Understand	CO 4	AECB01.19
16	Explain in brief the principle of operation of successive Approximation ADC	Understand	CO 4	AECB01.19
17	List the broad classification of ADCs	Understand	CO 4	AECB01.19

18	List the advantages of Resistor Ladder Type DAC	Understand	CO 4	AECB01.20
19	Give the applications of Flash type converter	Remember	CO 4	AECB01.18
20	What is Successive Approximation?	Remember	CO 4	AECB01.18
PART – B (LONG ANSWER QUESTIONS)				
1	Explain each block of the functional block diagram of 555 timer and list the advantages of 555 timer.	Understand	CO 4	AECB01.16
2	Draw the block diagram of an Astable multivibrator using 555timer and derive an expression for its frequency of oscillation	Remember	CO 4	AECB01.17
3	Explain the working of a Weighted resistor D/A converter using neat circuit diagram.	Understand	CO 4	AECB01.20
4	Discuss the successive approximation A/D converter and list the advantages of successive approximation A/D converter	Understand	CO 4	AECB01.19
5	Discuss the working principal of a dual slope A/D converter with neat circuit diagram	Understand	CO 4	AECB01.19
6	With neat diagram, explain the working principle of inverter R-2R ladder DAC.	Understand	CO 4	AECB01.20
7	Explain the working of a counter type A/D converter and state it's important feature	Understand	CO 4	AECB01.19
8	Describe the specifications, advantages and applications of Digital to Analog converters	Remember	CO 4	AECB01.20
9	Discuss the specifications, advantages and applications of Analog to Digital converters	Remember	CO 4	AECB01.19
10	With neat diagram, explain the working principle of R-2R ladder type DAC.	Remember	CO 4	AECB01.20
11	Discuss the operation of parallel comparator type ADC with circuit diagram.	Remember	CO 4	AECB01.19
12	Discuss 4 bit weighted resistor DAC with neat circuit diagram and list the advantages.	Understand	CO 4	AECB01.20
13	Illustrate the difference between the low pass and high pass	Understand	CO 4	AECB01.19
14	Discuss 4 bit weighted resistor DAC with neat circuit diagram and list the advantages.	Understand	CO 4	AECB01.20
15	Discuss the operation of parallel comparator type ADC with circuit diagram	Understand	CO 4	AECB01.20
16	Discuss the working principleof Data conversion.	Understand	CO 4	AECB01.20
17	Discuss about the flash type converter	Understand	CO 4	AECB01.18
18	What is Multi vibrator explain types of Multi vibrators	Understand	CO 4	AECB01.17
19	Explain the Ramp type counter with example	Understand	CO 4	AECB01.18
20	What is resistor ladder explain with example	Understand	CO 4	AECB01.18
PART-C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)				
1	Design an AstableMultivibrator using 555 Timer to produce 1Khz square wave form for duty cycle=0.50	Understand	CO 4	AECB01.17
2	Design a 555 based square wave generator to produce an asymmetrical square wave of 2 KHz. If	Remember	CO 4	AECB01.16

	Vcc=12V, draw the voltage curve across the timing capacitor and output waveform.			
3	Design and draw the wave forms of 1KHZ square waveform generator using555 Timer for duty cycle D=25% .	Understand	CO 4	AECB01.16
4	How many levels are possible in a two bit DAC what is its resolution if the output range is 0 to 3V.	Understand	CO 4	AECB01.20
5	Design a 4 – bit R-2R ladder type D/A convertor and plot the transfer characteristics that is binary input versus output voltage and calculate the resolution and linearity.	Remember	CO 4	AECB01.20
6	Calculate what is the conversion time of a 10 bit successive approximation A/D converter if its 6.85V.	Remember	CO 4	AECB01.19
7	Design an ADC converter has a binary input of 0010 and an analog output of 20mv. What is the resolution	Remember	CO 4	AECB01.19
8	Calculate the values of the LSB,MSB and full scale output for an 8 bit DAC for the 0 to 10V range	Remember	CO 4	AECB01.20
9	Draw the block diagram of a Monostablemultivibrator using 555timer and derive an expression for its frequency of oscillation	Remember	CO 4	AECB01.17
10	How many levels are possible in a two bit DAC what is its resolution if the output range is 0 to 3V.	Remember	CO 4	AECB01.20
MODULE-V BASIC DIGITAL ELECTRONICS				
PART – A (SHORT ANSWER QUESTIONS)				
1	Write short notes on binary number systems.	Remember	CO 5	AECB01.21
2	Discuss 1‟s and 2‟s complement.	Understand	CO 5	AECB01.21
3	Discuss octal number system.	Understand	CO 5	AECB01.21
4	Convert the octal numbers into binary, decimal and Hexadecimal numbers (45.5)8, (32.2)8.	Evaluate	CO 5	AECB01.21
5	Show an example to convert gray code to binary code.	Analysis	CO 5	AECB01.21
6	Describe a short note on four bit BCD codes.	Remember	CO 5	AECB01.21
7	Illustrate about unit –distance code? State where they are used.	Analysis	CO 5	AECB01.21
8	List the applications of error correcting codes.	Remember	CO 5	AECB01.21
9	Convert 10101101.0111 to octal equivalent and hexadecimal equivalent.	Evaluate	CO 5	AECB01.21
10	Give the examples of unit distance codes	Understand	CO 5	AECB01.21
11	Convert $(4085)_8$ into base 5.	Evaluate	CO 5	AECB01.21
12	Convert following hexadecimal number to decimal i) $F28_{16}$ ii) $BC2_{16}$	Evaluate	CO 5	AECB01.21
13	Which gates are called as universal gate justify.	Evaluate	CO 5	AECB01.21
14	State DeMorgan’s theorem	Remember	CO 5	AECB01.21
15	State Duality theorem.	Remember	CO 5	AECB01.22
16	Draw the symbols and truth tables of XOR and XNOR	Remember	CO 5	AECB01.22

	gates			
17	Define sum of products and product of sum	Remember	CO 5	AECB01.22
18	State and prove the distributive property of Boolean algebra.	Remember	CO 5	AECB01.22
19	Simplify ABC+AB'C+ABC'	Apply	CO 5	AECB01.22
20	Convert the given expression in standard SOP form Y= AC+AB+BC	Apply	CO 5	AECB01.22
PART – B (LONG ANSWER QUESTIONS)				
1	Define weighted codes and non weighted codes with examples?	Remember	CO 5	AECB01.21
2	Explain what do you mean by error detection and correcting code with examples.	Understand	CO 5	AECB01.21
3	Explain the gray to binary and binary- to- gray conversion with examples	Understand	CO 5	AECB01.21
4	Explain the conversion of AND/OR/NOT logic to NAND/ NOR logic with example.	Understand	CO 5	AECB01.22
5	Explain Self complemented codes.	Understand	CO 5	AECB01.22
6	Differentiate between BCD code and 2421 code and XS-3.	Analysis	CO 5	AECB01.22
7	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 5	AECB01.22
8	Realize all the logic gates using NAND gate.	Remember	CO 5	AECB01.23
9	Realize all the logic gates using NOR gate.	Remember	CO 5	AECB01.22
10	Explain standard SOP and POS forms with examples	Understand	CO 5	AECB01.23
11	State and prove Boolean theorems and properties.	Understand	CO 5	AECB01.22
12	Simplify the following 3 variable expression using Boolean algebra Y= $\prod$M(3,5,7).	Apply	CO 5	AECB01.22
13	Simplify the following 3 variable expression using Boolean algebra Y= $\sum$m(1,3,5,7).	Apply	CO 5	AECB01.22
14	Implement Y= ABCD using 2 input NAND gates	Apply	CO 5	AECB01.22
15	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)	Apply	CO 5	AECB01.22
16	For each of the following expressions, construct the corresponding logic circuit using AND/OR/INVERT logic. i) $Y=\overline{AB(C+D)}$ ii) Z= (W+PQ')'	Design	CO 5	AECB01.22
17	Convert the given expression in standard POS form Y= (A+B)(B+C)(A+C).	Apply	CO 5	AECB01.22
18	Design 2-digit BCD adder with the help of binary adders	Remember	CO 5	AECB01.23
19	Construct and explain the working of decimal adder	Remember	CO 5	AECB01.23
20	Differentiate serial adder and parallel adder.	Understand	CO 5	AECB01.22
PART - C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)				
1	Given the 8bit data word 01011011, generate the 12 bit composite word for the hamming code that corrects and	Analysis	CO 5	AECB01.21

	detects single errors.			
2	Write the first 10 decimal digits in base 3 and base 16.	Understand	CO 5	AECB01.23
3	A device transmits the binary data using even parity, the message is 1011001. Identify the receiver receives the correct data or not.	Analysis	CO 5	AECB01.21
4	Convert (4085)10 into base-4 and obtain its 9ˇs complement.	Evaluate	CO 5	AECB01.23
5	Convert the following Hexadecimal number to their Decimal equivalent (EAF1)16.	Evaluate	CO 5	AECB01.21
6	What is the gray code equivalent of the Hex Number 3A7. Find 9's complement of (25.639)10.	Evaluate	CO 5	AECB01.21
7	Find 7 bit hamming code for given message 1010 by using odd parity.	Evaluate	CO 5	AECB01.21
8	Perform the subtraction using 1's complement and 2's Complement i) $(11010)_2 - (10000)_2$ ii) $(1000100)_2 - (1010100)_2$	Understand	CO 5	AECB01.21
9	Obtain the canonical SOP form of the following functions. i) Y(A,B) = A+B. ii) Y(A,B,C,D) = AB+ACD	Evaluate	CO 5	AECB01.22
10	Simplify the expression Z= AB+AB'. (A'C')'	Apply	CO 5	AECB01.22

Signature of the Faculty **HOD, CE**