Hall Ticket No | | | | | | | | | | | Question Paper Code: AECB05

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER -I

B.Tech III Semester End Examinations November -2019

Regulations: IARER18

ANALOG AND DIGITAL ELECTRONICS

(IT)

Time: 3 hours **Max. Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. a) Explain about characteristics of PN Diode and Derive the expression for diode equation with neat sketches. **[7M]**
   b) Find the value of D.C. resistance and A.C resistance of a Germanium junction diode at 2500 with reverse saturation current, Io = 25μA and at an applied voltage of 0.2V across the diode? **[7M]**

2. a) Explain how Zener diode can act as a Voltage Regulator. **[7M]**
   b) 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?. **[7M]**

MODULE – II

3. a) Define Early-effect; Explain why it is called as base-width modulation? Discuss its consequences in transistors in detail? **[7M]**
   b) 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. **[7M]**

4. a) Draw the input and output characteristic of a transistor in common collector configurations? **[7M]**
   b) Draw small signal equivalent circuit of Emitter Follower using accurate hparameter model. For the emitter follower circuit with RS= 0.5K and RL =5K, calculate Ri, AV and RO. Assume, hfe = 50, hie =1K, hoe = 25 μA/V. **[7M]**

MODULE – III

5. a) Add the following binary numbers. **[7M]**
      i) 11011+1101
      ii) 10111.101 + 110111.01
      iii) 1010.11 + 1101.10
   b) Convert the following numbers from the given base to the other bases indicated. **[7M]**
      i) Decimal 225 to binary, octal
      ii) Octal 623 to decimal, binary

6. a) The state of a 12-bit register is 010110010111. What is its content if it represents: **[7M]**

i) three decimal digits in BCD

ii) three decimal digits in Excess-3 code

b) Add the following BCD numbers **[7M]**

i)1001 and 0100

ii) 00010110 and 00010101

MODULE – IV

7. a) Implement full subtractor using NAND gates. **[7M]**

b) Simplify the following Boolean function using, four-variable K-map **[7M]**
F (A, B, C, D) = Σm (0, 2, 4, 5, 6, 7, 8, 10, 13,15)

8. a) Design a combinational circuit that adds 4-bit number. The circuit can be designed using four full-adders. **[7M]**

b) Design a combinational circuit with four inputs that represent a decimal digit in BCD and four outputs that produce the 9's complement of the input digit. **[7M]**

MODULE – V

9. a) Explain the Ripple counter design. Also the decade counters design? **[7M]**

b) Define JK – Flip-flop with the help of a logic diagram and characteristic table? **[7M]**

10. a) Define Latch. Explain about Different types of Latches in detail? **[7M]**

b) Design a MOD-5 synchronous counter using flip flops and **[7M]**
Implement it? Also draw the timing diagram?

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

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 (COs):

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 (CLOs):

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 & Weighted codes & Non-weighted codes.
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 K-Maps and realize the Boolean function using logic gates.
AECB05.17	Analyze the design procedures of Combinational logic circuits like adder, binary adder, carry look ahead adder.

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 .

MAPPING OF SEMESTER END EXAMINATION - COURSE OUTCOMES

SEE Question No		Course Learning Outcomes		Course Outcomes	Blooms Taxonomy Level
1	a	AECB05.01	Understand and analyze diodes operation and their characteristics in order to design basic form circuits	CO 1	Understand
	b	AECB05.01	Understand and analyze diodes operation and their characteristics in order to design basic form circuits	CO 1	Understand
2	a	AECB05.07	Understand and analyze diodes operation and their characteristics in order to design basic form circuits	CO 1	Understand
	b	AECB05.07	Design rectifier with capacitive filter for the given specifications	CO 1	Understand
3	a	AECB05.05	Understand the different parameters of transistors such as depletion width and channel width for understanding the functioning and design of this component.	CO 2	Understand
	b	AECB05.09	Understand the importance of h-parameter model	CO 2	Remember
4	a	AECB05.08	Estimate the performance of BJT on the basis of their operation and working.	CO 2	Understand
	b	AECB05.08	Understand the importance of h-parameter model	CO 2	Understand
5	a	AECB05.10	Understand the basic concept of number systems,Binary addition and subtraction for digital systems.	CO 3	Understand
	b	AECB05.11	Understand the basic concept of number systems, Binary addition and subtraction for digital systems.	CO 3	Understand
6	a	AECB05.11	Explain the complements of Binary & Weighted codes & Non-weighted codes.	CO 3	Understand
	b	AECB05.11	Explain the complements of Binary & Weighted codes &Non-weighted codes.	CO 3	Understand
7	a	AECB05.17	Implement full subtractor using NAND gates.	CO 4	Understand
	b	AECB05.13	Identify the importance of SOP and POS canonical forms in the minimization or other optimization of Boolean formulas in general and digital circuits.	CO 4	Understand
8	a	AECB05.17	Analyze the design procedures of Combinational logic circuits like adder, binary adder, carry look ahead adder.	CO 4	Understand
	b	AECB05.18	Analyze the design procedures of Combinational logic circuits like adder, binary adder, carry look ahead adder.	CO 4	Understand
9	a	AECB05.20	Understand bi-stable elements like latches flip-flop and Illustrate the excitation tables of different flip flops	CO 5	Understand
	b	AECB05.19	Understand the concept of Shift Registers and implement the bidirectional and universal shift registers.	CO 5	Understand
10	a	AECB05.19	Understand the concept of Shift Registers and implement the bidirectional and universal shift registers.	CO 5	Understand
	b	AECB05.20	Implement the synchronous& asynchronous counters using design procedure of sequential circuit	CO 5	Understand

Signature of course coordinator **HOD,IT**