

Hall Ticket No

Question Paper Code: AEEB04



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

## MODEL QUESTION PAPER

B.Tech II Semester End Examinations, April – 2020

Regulations: IARE-R18

### BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(MECH)

Time: 3 hours

Max. Marks: 70

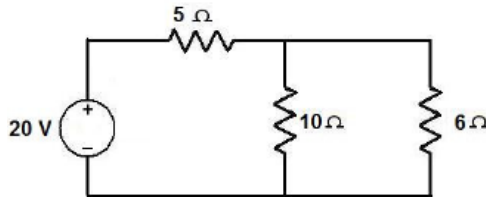
Answer ONE Question from each Module

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

#### MODULE – I

- State ohms law and its limitations and three resistors  $50\Omega$ ,  $20\Omega$ ,  $30\Omega$  connected in parallel and supplied by  $20V$  source find the currents in all branches and total resistance across source. [7M]
  - Calculate the power consumed by each resistor [7M]



- Three resistors  $5\Omega$ ,  $2\Omega$ ,  $3\Omega$  connected in parallel and supplied by  $20A$  source find the currents in all branches and total resistance across source [7M]
  - Derive delta to star transformation and Classification of different type of measuring instruments [7M]

#### MODULE – II

- Explain working principle, construction and different parts of DC Generator [7M]
  - Derive torque of dc motor and Explain the losses that occur in a DC machine. [7M]
- Explain the types of DC generators in detail and Explain 3point starter with neat diagram. [7M]
  - A lap wound DC generator having 80 slots with 10 conductors per slot generates at no load emf of  $400V$ , when running at  $1000\text{ rpm}$ . At what speed should it be rotated to generate a voltage of  $220V$  on open circuit. [7M]

### MODULE – III

5. a) Define Maximum value, Average value, Form factor peak factor. [7M]  
b) Working principle of transformer under [7M]  
    i) No load and  
    ii) Full load with wave forms
6. a) An alternating current is expressed as  $I = 14.14 \sin 314t$ . [7M]  
    Determine:  
        i) RMS current  
        ii) Average current  
        iii) Form factor  
        iv) Peak factor..
- b) Explain the working principle of Alternator, three phase induction motor is [7M]  
    wound for 4-poles and is supplied from a 50 Hz supply.  
    Calculate  
        i) The synchronous speed  
        ii) The speed of the motor when the slip is 3 %  
        iii) The rotor frequency.

### MODULE – IV

7. a) Define efficiency, form factor, peak inverse voltage and ripple factor of an half [7M]  
    wave rectifier and Explain the theory of PN junction in semiconductors and explain  
    how it acts as  
    Diode.
- b) A full wave rectifier circuit uses two silicon diodes with a forward resistance of [7M]  
     $20\Omega$  each. A DC voltmeter connected across the load of  $1K\Omega$  reads 55.4 volts.  
    Calculate  
        i)  $I_{rms}$   
        ii) Average voltage across each diode  
        iii) Ripple factor  
        iv) Transformer secondary voltage rating.
8. a) Draw the V-I characteristics of diode, and Define rectifier and describe all [7M]  
    parameters for Centre tapped full wave rectifier
- b) A full wave bridge rectifier having load resistance of  $100\Omega$  is fed with 220V, 50Hz [7M]  
    through a step-down transformer of turn's ratio 11:1. Assuming the diodes ideal,  
    calculate  
        i) DC output voltage  
        ii) Peak inverse voltage  
        iii) Rectifier efficiency.

### MODULE – V

9. a) Define amplifier and Biasing and Draw the input and output characteristics of a transistor in common collector Configurations? [7M]
- b) Calculate the values of  $I_C$  and  $I_E$  for a transistor with  $\alpha_{dc} = 0.99$  and  $I_{CBO} = 5\mu A$ , if  $I_B$  is measured as  $20\mu A$ ? [7M]
10. a) Define active region and saturation region and Explain the constructional details of Bipolar Junction Transistor? [7M]
- b) If the base current in a transistor is  $20\mu A$  when the emitter current is  $6.4mA$ , what are the values of  $\alpha_{dc}$  and  $\beta_{dc}$ ? Also determine the collector current? [7M]



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## COURSE OBJECTIVES:

The course should enable the students to:

I	Understand Kirchoff laws and their application in series and parallel circuits.
II	Discuss principle and operation of measuring instruments.
III	Analyze the characteristics of alternating quantities, electrical machines.
IV	Illustrate the V-I characteristics of various diodes and bi-polar junction transistor.

## COURSE OUTCOMES (COs):

CO 1	Understand the basic concepts of electricity, application's of Kirchoff laws and source transformation technique to complex circuits and basic principles of indicating instruments.
CO 2	Explore to the working principle of dc machine, various types and determine the torque equation of dc motor, EMF equation of dc generator purpose of three-point starter.
CO 3	Summarize various alternating quantities and explain working principle of induction motor, alternators and transformers.
CO 4	Discuss the basic theory of semi-conductor diode, rectifier, zener diode and their characteristics.
CO 5	Explain the concept of transistor in various configurations and give its applications.

## COURSE LEARNING OUTCOMES (CLOs):

AEEB04.01	Analyze the circuits using Kirchoff's current and Kirchoff's voltage law.
AEEB04.02	Use of series-parallel concepts for simplifying circuits.
AEEB04.03	Use star delta transformation for simplifying complex circuits.
AEEB04.04	Generalize operation and principle of measuring instruments.
AEEB04.05	Demonstrate the working principle of DC motor, DC generator.
AEEB04.06	Describe the construction of DC motor and DC generator.
AEEB04.07	Classify the types of DC motor and generator with characteristics and voltage, current and power equations.
AEEB04.08	Derive the EMF equation of DC generator, and various problems on EMF equation.
AEEB04.09	Torque equation of DC motor and understand the purpose of three point starter.
AEEB04.10	List out various alternating quantities such as Sinusoidal AC voltage, average and RMS values, form and peak factor, and understand concept of three phase alternating quantity.
AEEB04.11	Discuss the principle of operation of induction motor.
AEEB04.12	Explain the construction and characteristics of alternator.
AEEB04.13	Explain the construction and characteristics of 3-phase induction motor.
AEEB04.14	Explain the principle and construction of Transformer.

AEEB04.15	Understand the working of semi-conductor diode and its V-I characteristics.
AEEB04.16	Discuss the operation of half wave, full wave and bridge rectifiers.
AEEB04.17	Summarize various alternating quantities of half wave, full wave and bridge rectifiers.
AEEB04.18	Apply the concept of diodes in converting AC to DC rectification process.
AEEB04.19	Compare the operation of half wave, full wave and bridge rectifiers.
AEEB04.20	Distinguish the different configurations of transistor.
AEEB04.21	Differentiate the operation of Diodes and transistors.
AEEB04.22	Understand the concept of biasing and load line of transistor.

### MAPPING OF SEMESTER END EXAMINATION - COURSE OUTCOMES

SEE Question No	Course Learning Outcomes		Course Outcomes	Blooms Taxonomy Level	
1	a	AEEB04.01	Analyze the circuits using Kirchhoff's current and Kirchhoff's voltage law.	CO 1	Understand
	b	AEEB04.03	Use star delta transformation for simplifying complex circuits.	CO 1	Understand
2	a	AEEB04.02	Use of series-parallel concepts for simplifying circuits.	CO 1	Understand
	b	AEEB04.04	Use star delta transformation for simplifying complex circuits.	CO 1	Understand
3	a	AEEB04.08	Derive the EMF equation of DC generator, and various problems on EMF equation.	CO 2	Understand
	b	AEEB04.09	Torque equation of DC motor and understand the purpose of three point starter.	CO 2	Remember
4	a	AEEB04.06	Classify the types of DC motor and generator with characteristics and voltage, current and power equations.	CO 2	Understand
	b	AEEB04.08	Derive the EMF equation of DC generator, and various problems on EMF equation.	CO 2	Understand
5	a	AEEB04.10	List out various alternating quantities such as Sinusoidal AC voltage, average and RMS values, form and peak factor, and understand concept of three phase alternating quantity.	CO 3	Understand
	b	AEEB04.14	Explain the principle and construction of Transformer	CO 3	Understand
6	a	AEEB04.10	List out various alternating quantities such as Sinusoidal AC voltage, average and RMS values, form and peak factor, and understand concept of three phase alternating quantity.	CO 3	Understand
	b	AEEB04.12	Explain the construction and characteristics of alternator.	CO 3	Understand
7	a	AEEB04.15	Understand the working of semi-conductor diode and its V-I characteristics.	CO 4	Understand
	b	AEEB04.16	Discuss the operation of half wave, full wave and bridge rectifiers.	CO 4	Understand
8	a	AEEB04.15	Understand the working of semi-conductor diode and its V-I characteristics.	CO 4	Understand
	b	AEEB04.16	Discuss the operation of half wave, full wave and bridge rectifiers.	CO 4	Understand
9	a	AEEB04.20	Distinguish the different configurations of transistor.	CO 5	Understand
	b	AEEB04.21	Differentiate the operation of Diodes and transistors.	CO 5	Understand

10	a	AEEB04.20	Distinguish the different configurations of transistor.	CO 5	Understand
	b	AEEB04.22	Understand the concept of biasing and load line of transistor.	CO 5	Understand

**Signature of Course Coordinator**

**HOD, ME**