INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER-I

B.Tech I Semester End Examinations, November – 2019
Regulations: IARE-R18
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(CIVIL)

**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

UNIT – I

1. a) State ohms law and its limitations and three resistors 50Ω, 20Ω,30Ω connected in **[7M]** parallel and supplied by 20V source find the currents in all branches and total resistance across source.
    b) Calculate the power consumed by each resistor **[7M]**

                                                                                        [7M]
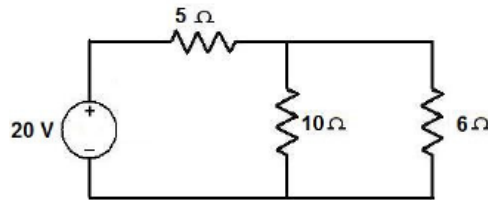
2. a) Three resistors 5Ω, 2Ω,3Ω connected in parallel and supplied by 20amps source **[7M]** find the currents in all branches and total resistance across source
    b) Derive delta to star transformation and Classification of different type of measuring instruments
        .

UNIT – II

3. a) Explain working principle, construction and different parts of DC Generator **[7M]**
    b) Derive torque of dc motor and Explain the losses that occur in a DC machine. **[7M]**

4. a) Explain the types of DC generators in detail and Explain 3point starter with neat **[7M]** diagram.
    b) A lap wound DC generator having 80 slots with 10 conductors per slot generates at **[7M]** no load emf of 400V, when running at 1000 rpm. At what speed should it be rotated to generate a voltage of 220V on open circuit.

UNIT – 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.

UNIT – 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]**
       20Ω each. A DC voltmeter connected across the load of 1KΩ 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 100Ω 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.

UNIT – 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 μA?   **[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 α_{dc} and β_{dc}? Also determine the collector current?   **[7M]**

COURSE OBJECTIVES:

The course should enable the students to:

I	Understand Kirchhoff 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 Kirchhoff 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 Kirchhoff's current and Kirchhoff'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 of3-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, CE**