



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER

B.Tech II Semester End Examinations, April - 2020

Regulations: 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

1. a) State Kirchhoff's voltage law and Kirchhoff's current law. Make short notes on practical sources and ideal sources. [7M]
- b) Determine the value of the source current for the circuits shown in the Figure 1, using delta star transformation. [7M]

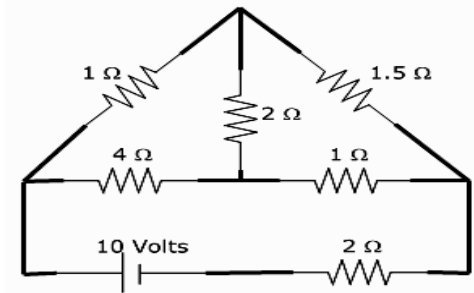


Figure 1

2. a) Calculate the power delivered by the source in the circuit as shown in the Figure 2. [7M]

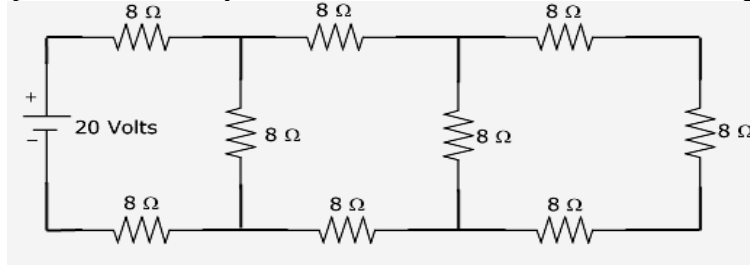


Figure 2

- b) Demonstrate the principle of operation of permanent magnet moving coil instrument and moving iron instruments. [7M]

MODULE – II

3. a) Explain the principle of operation of DC motor. Derive the torque equation of DC motor. [7M]
b) Determine the developed torque and shaft torque of 220V, 4 pole DC series motor with 800 conductors wave connected, supplying a load of 10 kW by taking 50A from the mains. The flux per pole is 20mWb and its armature circuit resistance is 0.8Ω. [7M]
4. a) Describe the constructional features of DC machine. Explain the process of commutation in DC machines. [7M]
b) A 6 pole DC generator runs at 850 rpm and each pole has a flux of 12mWb. Determine the generated emf, if there are 150 conductors in series between each pair of brushes. [7M]

MODULE – III

5. a) Demonstrate the working principle of a single phase transformer? Explain with the help of a neat sketch. [7M]
b) A transformer supplied a load of 32A at 415V. If the primary voltage is 3320V, determine the primary current, primary volt ampere, secondary volt amperes. Neglect losses and magnetizing current. [7M]
6. a) Explain the working principle of induction motor. Derive the expression for torque developed in induction motors. [7M]
b) A 6-pole, 50Hz squirrel cage induction motor runs on load at a shaft speed of 970 rpm. Calculate the slip and frequency of induced current in the rotor. [7M]

MODULE – IV

7. a) Discuss the following diode parameters: [7M]
i) PIV
ii) Dynamic resistance
iii) Static resistance
iv) Cut in voltage
v) Reverse saturation current
vi) Reverse breakdown voltage
b) Explain the working principle of a half wave rectifier with neat circuit diagram and related wave forms. Compute the output equations. [7M]
8. a) Describe the VI characteristics of Zener diode and give its application as voltage regulator. [7M]
b) The i/p to the full wave rectifier is $v(t) = 200\sin 50t$. If R_L is 1kΩ and forward resistance of diode is 50Ω, calculate: [7M]
i) DC current through the circuit
ii) The AC (rms) value of current through the circuit
iii) The DC output voltage
iv) The AC power input
v) The DC power output
vi) Rectifier efficiency.

MODULE – V

9. a) Describe the functioning of BJT in common base configuration with the help of its input and output characteristics. [7M]
- b) Estimate 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) Summarize the common emitter circuit and sketch the input and output characteristics. Also explain active region, cutoff region and saturation region by indicating them on the characteristic curves. [7M]
- b) Compute the values of α , I_E and I_C in a common emitter transistor circuit if $\beta = 100$ and $I_B = 50\mu A$. [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	Generalize operation and principle of measuring instruments.	CO 1	Understand
3	a	AEEB04.09	Torque equation of DC motor and understand the purpose of three point starter.	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	Describe the construction of DC motor and DC generator.	CO 2	Understand
	b	AEEB04.08	Derive the EMF equation of DC generator, and various problems on EMF equation.	CO 2	Understand
5	a	AEEB04.14	Explain the principle and construction of Transformer	CO 3	Understand
	b	AEEB04.14	Explain the principle and construction of Transformer	CO 3	Understand
6	a	AEEB04.13	Explain the construction and characteristics of 3-phase induction motor.	CO 3	Understand
	b	AEEB04.13	Explain the construction and characteristics of 3-phase induction motor.	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	AEEB04.17	Summarize various alternating quantities 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