

H.T No:

R22

Course Code: B443401



CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

M.Tech I Semester Regular Examinations March-2023

Course Name: MACHINE MODELING & ANALYSIS

(Power Electronics)

Date: 20.03.2023 FN

Time: 3 hours

Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries ONE mark.

10x1=10M

1. Write Transfer function of motor. 1 M
2. Draw the mathematical model of DC Shunt motor. 1 M
3. What are the advantages of Phase Transformation? 1 M
4. What is Linear Transformation? 1 M
5. Write the voltage equation of Induction motor in Stator Reference frame. 1 M
6. Write the Torque equation of Induction motor. 1 M
7. Write the Torque equation of Synchronous motor. 1 M
8. What is two axis representation of Synchronous motor? 1 M
9. Write applications of Permanent Magnet Synchronous motor. 1 M
10. Write advantages of BLDC motor. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). What is primitive 2-axis machine? How the various windings of a machine are represented by the primitive machine and write the voltage equations? 10M
- OR**
- 11.B). Explain about the basic conventions adopted in the development of the generalized machine theory. 10M
12. A). Obtain identical transformations for currents and voltages from a rotating balanced 3- phase (a, b, c) winding to a rotating balanced 2-phase (α , β) winding. Show that the power invariance is maintained under this transformation. 10M
- OR**
12. B). Draw the basic circuit model of 3- ϕ induction motor as well as rotor. Obtain expressions for flux linkages Ψ_a , Ψ_b and Ψ_c of a 3- ϕ induction motor from fundamental equations. 10M
13. A). Obtain the state space model of a 3- ϕ induction motor with i) Stator reference frame ii) Rotor reference frame. 10M
- OR**
13. B). Derive the generalized model of three phase induction machine with Synchronously reference frame. Derive the torque relation from it. 10M

(P.T.O.)

14. A). Obtain the voltage equations of 3- ϕ synchronous motor in state variable form with reference to stator reference frame. And also write the torque equation of this motor. 10M

OR

14. B). i) Derive the voltage equations of a synchronous machine in rotor reference frame. 5M
ii) Derive the mathematical representation of a synchronous machine. 5M

15. A). Explain the Modelling of BLDC motor with neat diagram. 10M

OR

15. B). Explain the Modelling of Permanent magnet Synchronous motor with neat diagram. 10M

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Course Code: B443408



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

M.Tech I Semester Regular Examinations March-2023

Course Name: ELECTRIC VEHICLES AND DESIGN
(Power Electronics)

Date: 23.03.2023 FN

Time: 3 hours

Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries ONE mark.

10x1=10M

1. What are disadvantages of a conventional vehicle? 1 M
2. Define grading resistance. 1 M
3. What is hybrid vehicle? 1 M
4. Mention the types of configurations in hybrid drive trains. 1 M
5. List out the components in electric propulsion sub system. 1 M
6. Define drive system efficiency. 1 M
7. What is energy storage? 1 M
8. Define fuel cell. 1 M
9. What are strategies used in hybrid and electric vehicles? 1 M
10. What is importance of energy management strategies? 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Explain about the vehicle power source characterization. 10M
- OR**
11. B). Discuss the vehicle transmission characteristics with sketch. 10M
12. A). Analyze the various hybrid drive trains topologies. 10M
- OR**
12. B). Explain the impact of modern drive trains on energy supplies in hybrid electric vehicle. 10M
13. A). Discuss the configuration and control of DC motor drives in electric vehicle. 10M
- OR**
13. B). Explain in detail about drive system efficiency. 10M
14. A). How to decide the sizing of propulsion motor and power electronics for electric vehicle? 10M
- OR**
14. B). Discuss in detail about battery-based energy storage in electric vehicle. 10M
15. A). Explain the design of battery electric vehicle (Case study). 10M
- OR**
15. B). Analyze the types of energy management strategies for electric vehicles. 10M

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Course Code: B443301



CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

M.Tech I Semester Regular Examinations March-2023

Course Name: **ADVANCED POWER ELECTRONIC CONVERTER-I**

(Power Electronics)

Date: 25.03.2023 FN

Time: 3 hours

Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries ONE mark.

10x1=10M

1. Show the equivalent circuit of IGCT. 1 M
2. Construct the structure of IGBT. 1 M
3. Write the formula for output voltage of 1-ph half controlled converter using R load. 1 M
4. Write the formula for output voltage of 3-ph fully controlled converter using RLE load. 1 M
5. What is Modified PWM technique? 1 M
6. List the types of PWM controls. 1 M
7. Outline Third Harmonic PWM techniques. 1 M
8. What is Harmonic injection modulation technique? 1 M
9. Choose one difference between Diode clamped & Improved diode Clamped inverters. 1 M
10. Define multi-level Inverter. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Summarize the symbol, structure & equivalent circuit of Power Integrated Circuit, in detail. 10M

OR

- 11.B). Explain reverse recovery characteristics of diode. Hence, draw their characteristics curves. Why simultaneous firing of thyristor is required? Explain. 10M

12. A). Explain Power factor Improvements Techniques in the context of Three phase converters. 10M

OR

12. B). A three-phase, half wave converter is operated from a 3-phase, Y-connected 440 V, 50 Hz supply and the load resistance is $R = 20 \Omega$. If it is required to obtain an average output voltage of 50% of the maximum possible output voltage, calculate: i). Firing angle, ii). Rectification efficiency and iii). Input power factor. 10M

13. A). Explain Delta modulation PWM technique and compare with other techniques. 10M

OR

13. B). Develop the principle of operation of 1-ph bridge inverter with R & RL loads. 10M

(P.T.O..)

14. A). Explain the operation of sinusoidal PWM control-based 1-ph full converter. 10M

OR

14. B). Analyze 180-degree conduction for output voltage and current with resistive, inductive loads for three phase inverters. 10M

15. A). Utilize DC link capacitor voltage balancing technique in 3-ph inverters. 10M

OR

15. B). Extend the 1-phase flying capacitors multilevel inverter operation? Compare its features with 1- phase diode-clamped multilevel inverter. 10M

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Course Code: B443302



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

M.Tech I Semester Regular Examinations March-2023

Course Name: ELECTRICAL DRIVES

(Power Electronics)

Date: 27.03.2023 FN

Time: 3 hours

Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries ONE mark.

10x1=10M

1. List out any two functions of power modulator. 1 M
2. What you understand by the steady state stability. 1 M
3. Which type of chopper is used to control dc motor? 1 M
4. For a step-up chopper, when the duty cycle is increased, what is the average value of the output voltage. 1 M
5. What are the advantages of squirrel cage induction motor over DC motors? 1 M
6. Variable frequency control of induction motor is more efficient than stator voltage control, why? 1 M
7. What are the types of vector control of induction motor? 1 M
8. What is vector control also known as? 1 M
9. When operating in true synchronous mode, why the frequency must be changed in small steps? 1 M
10. What are the important features of permanent magnet synchronous motor? 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Briefly explain the design of current regulator and speed controller in the feedback system. 10M

OR

11. B). Analyze the performance of three phase converter controlled DC Motor Drive 10M

12. A). What is the need for current controller? Explain the operation of hysteresis current control scheme. 10M

OR

12. B). Explain closed loop control of one-quadrant chopper controlled separately excited DC motor drive for a step-command in speed reference in normalized form? 10M

13. A). Explain the phasor diagram and speed control of static Kramer's drive. 10M

OR

13. B). Explain the speed torque characteristics of induction motor in constant torque and field weakening regions. 10M

(P.T.O.)

14. A). Explain the following: i) Adaptive control principle and ii) Self tuning regulator. 10M

OR

14. B). Explain the implantation process of indirect vector control. 10M

15. A). Explain the control strategies of synchronous motor. 10M

OR

15. B). Explain the following: i) Constant torque angle control and ii) Unity power factor control. 10M

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Course Code: B420303



CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

M.Tech I Semester Regular Examinations March-2023

Course Name: RESEARCH METHODOLOGY & IPR

(Common for all Branches)

Date: 29.03.2023 FN

Time: 3 hours

Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries ONE mark.

10x1=10M

1. Define the meaning of research. 1 M
2. List the sources of data collection. 1 M
3. What are the various literature studies approaches? 1 M
4. What do you mean by Research Ethics? 1 M
5. Who are involved in research committee? 1 M
6. Differentiate between a report and paper for research proposal. 1 M
7. What is Patenting under PCT? 1 M
8. Define trademark. 1 M
9. How is the patent information stored? 1 M
10. List the various patent databases. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Explain the meaning and sources of Research problem. 10M
- OR**
11. B). Discuss in detail about the types of errors in selecting a research problem. 10M
12. A). Explain the effective literature studies approaches in research. 10M
- OR**
12. B). What is Plagiarism? Explain how it is affecting the research process. 10M
13. A). Explain the mechanics of writing a research report. 10M
- OR**
13. B). Discuss in detail about effective technical writing and paper in developing research proposal. 10M
14. A). Explain the processing of patenting and development. 10M
- OR**
14. B). What are the salient features of designs and copyrights? 10M
15. A). Explain the scope of patent rights and geographical indications. 10M
- OR**
15. B). Describe the salient features of Administration of patent system. 10M
