

H.T No:

**R18**

Course Code: A30237



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

**B.Tech VII Semester Supplementary Examinations April-2025**

**Course Name: HVDC Transmission**

**(Electrical & Electronics Engineering)**

**Date: 24.04.2025 AN**

**Time: 3 hours**

**Max.Marks: 70**

**(Note: Assume suitable data if necessary)**

**PART-A**

**Answer all TEN questions**

**Each question carries TWO marks.**

**10x2=20M**

1. What are the applications of DC transmission system? 2 M
2. Differentiate between 6-pulse and 12-pulse converters. 2 M
3. What is meant by a static VAR compensation system? 2 M
4. What is meant by firing angle control? 2 M
5. Write the expression for DC power in a converter? 2 M
6. Draw the schematic of a DC converter. 2 M
7. How corona affects the DC line? 2 M
8. What is radio interference? 2 M
9. What are the types of AC filters? 2 M
10. Define uncharacteristic harmonics. 2 M

**PART-B**

**Answer the following. Each question carries TEN Marks.**

**5x10=50M**

- 11.A). Explain planning and modern trends in DC transmission. 10M
- OR**
11. B). Briefly explain the Economics and terminal equipment of HVDC transmission systems. 10M
12. A). Explain in detail the converter control characteristics of HVDC systems. 10M
- OR**
12. B). Discuss the various sources of reactive power for HVDC converters. 10M
13. A). Compare simultaneous and sequential methods of power flow analysis. 10M
- OR**
13. B). Derive and explain the solution of AC/DC load flow problem using simultaneous method. 10M
14. A). Discuss various converter faults in detail. 10M
- OR**
14. B). Explain the following i) Smoothing reactors ii) Dc breakers. 10M
15. A). Explain the design aspects of single tuned filter. 10M
- OR**
15. B). Discuss about the calculation of characteristic AC harmonics with relevant equation. 10M

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**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

**B.Tech VII Semester Supplementary Examinations April-2025**

**Course Name: Switched Mode Power Supply**  
(Electrical & Electronics Engineering)

Date: 24.04.2025 AN

Time: 3 hours

Max.Marks: 70

(Note: Assume suitable data if necessary)

**PART-A**

Answer all TEN questions

Each question carries TWO marks.

10x2=20M

- |  |     |
|--|-----|
| 1. What is peak to peak current ripple?  | 2 M |
| 2. Define amp-second balance of capacitor.                                     | 2 M |
| 3. List types of DC-DC converters.   | 2 M |
| 4. Mention the application of buck converter.                                  | 2 M |
| 5. List out different resonant switch converters.                              | 2 M |
| 6. Define transition switching losses.   | 2 M |
| 7. Which parameters effect the efficiency of transformer switching converters? | 2 M |
| 8. What are the advantages of transformer switching converters?                | 2 M |
| 9. What is the reason for having low backup time in UPS?                       | 2 M |
| 10. How to select the capacitors for UPS.                                      | 2 M |

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- |  |     |
|--|-----|
| 11.A). Explain the operation of basic switching converter with resistive-inductive load.   | 10M |
| <b>OR</b>  |     |
| 11.B). Consider a power converter that has reached the steady state. Show that the average power absorbed by the inductor in one switching cycle is zero.    | 10M |
| 12. A). Explain the operation of buck DC-DC converter with relevant waveforms.   | 10M |
| <b>OR</b>  |     |
| 12. B). Draw the equivalent circuit for a boost converter including the losses in the transistor, the diode and the inductor. Then calculate the duty cycle. | 10M |
| 13. A). Explain different types of voltage-mode quasi-resonant switches.   | 10M |
| <b>OR</b>  |     |
| 13. B). Explain the operation of ZVS resonant converter with neat circuit diagram.   | 10M |
| 14. A). Explain fly back converter- mode operation with necessary waveforms?   | 10M |
| <b>OR</b>  |     |
| 14. B). Explain full bridge switching converter- mode operation with necessary waveforms?  | 10M |
| 15. A). With circuit diagram explain the working principle of offline UPS.   | 10M |
| <b>OR</b>  |     |
| 15. B). Briefly explain the current filters and DC filters.  | 10M |

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**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

B.Tech VII Semester Supplementary Examinations April-2025

Course Name: **Utilization of Electrical Energy**  
(Electrical & Electronics Engineering)

Date: 26.04.2025 AN

Time: 3 hours

Max.Marks: 70

(Note: Assume suitable data if necessary)

**PART-A**

Answer all TEN questions

Each question carries TWO marks.

10x2=20M

1. Define electric drive. Name any two types commonly used in industrial applications. 2 M
2. Differentiate continuous and intermittent loads in terms of impact on motor performance. 2 M
3. List out the advantages of electric heating over conventional heating methods. 2 M
4. State the advantages of using AC welding over DC welding. 2 M
5. Write short note on illumination. 2 M
6. What are the advantages of fluorescent tubes over tungsten filament lamps? 2 M
7. How does the duration of stop affect the schedule speed? 2 M
8. Compare AC and DC systems of railway electrification from the point of view of main line service. 2 M
9. Enumerate the factors affecting the specific energy consumption of a train. 2 M
10. What is the effect of varying acceleration and braking retardation? 2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Explain the criteria for selecting a motor for heavy-duty industrial machinery. Provide examples of suitable motors for applications like conveyor belts and cranes, justifying your choices. 10M

**OR**

11. B). Analyze the causes and effects of temperature rise in electric drives. Propose measures to manage and minimize temperature rise to improve motor performance and reliability. 10M
12. A). Describe the working of resistance heating and outline its industrial applications. Explain the significance of choosing appropriate materials for heating elements. 10M

**OR**

12. B). Explain the construction and working of electric arc welding equipment. Include a detailed description of the power source, electrode holder, and work clamp, and discuss safety precautions. 10M
13. A). (i) Explain the laws of illumination. 5M  
(ii) Find the candle power of a lamp to produce an illumination of 8 lux on a surface of 5 m from the lamp when the light rays are (a) normal to the surface (b) inclined to normal at 60° (c) parallel to the surface. 5M

**OR**

13. B). (i) State and describe various types of lighting schemes. 5M  
(ii) In a street lighting scheme, lamps with candle power of 500 are hung at a height of 5 m. The distance between the posts is 10 m. Determine the illumination under lamps and at the midpoint between the posts. 5M

(P.T.O..)

14. A). (i) With a diagram, explain the working of rheostat braking in electric traction. 5M  
(ii) A train runs at an average speed of 50 kmph between stations situated 2.5 km apart. It accelerates at 2 kmphs and retards at 3 kmphs. Draw the speed-time curve for the run and find its maximum speed assuming a trapezoidal speed-time curve. 5M

**OR**

14. B). (i) State the main requirements of an ideal traction system. 5M  
(ii) Explain the mechanics of train movement. 5M

15. A). Deduce the expression for total tractive effort required for propulsion of train. 10M

**OR**

15. B). (i) Determine the specific energy output using simplified speed-time curve. 5M  
(ii) Write short note on Adhesive weight of a train. 5M

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**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

B.Tech VII Semester Supplementary Examinations April/May-2025

**Course Name: Flexible AC Transmission System Devices**  
(Electrical & Electronics Engineering)

Date: 01.05.2025 AN

Time: 3 hours

Max.Marks: 70

(Note: Assume suitable data if necessary)

**PART-A**

Answer all TEN questions

Each question carries TWO marks.

10x2=20M

1. Write about the advantages of FACTS controllers. 2 M
2. List the basic types of FACTS controllers. 2 M
3. Define pulse number. 2 M
4. What is the difference between Current source converter and Voltage source converter? 2 M
5. Mention the objectives of Shunt compensation. 2 M
6. Define Voltage instability. 2 M
7. What is STATCOM? 2 M
8. Draw the V-I Characteristics of SVC. 2 M
9. What is the main function of series compensation? 2 M
10. How is the variation of capacitive reactance achieved in TCSC? 2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Explain the concepts of power flow in parallel paths and meshed paths with suitable example. 10M
- OR**
11. B). Briefly describe about basic types of FACTS controllers. 10M
12. A). Compare the current source converter with voltage source converters. 10M
- OR**
12. B). Explain the concept of three-level voltage source converter. 10M
13. A). Explain midpoint voltage regulation for line segmentation for shunt compensation. 10M
- OR**
13. B). Briefly describe the operating principle and control approaches of Switching converter type Var generator. 10M
14. A). Explain how transient stability enhancement is achieved using SVC. 10M
- OR**
14. B). Explain the working of STATCOM with a neat sketch? Explain in what way it differs from SVC? 10M
15. A). Write short notes with respect to series compensation on
- i) Improvement of transient stability 5M
  - ii) Power oscillation damping 5M
- OR**
15. B). Explain the control schemes for GSC and TSSC. 10M

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**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

B.Tech VII Semester Supplementary Examinations April/May-2025

**Course Name: Reliability Engineering**  
(Electrical & Electronics Engineering)

Date: 01.05.2025 AN

Time: 3 hours

Max.Marks: 70

(Note: Assume suitable data if necessary)

**PART-A**

Answer all TEN questions  
Each question carries TWO marks.

10x2=20M

1. Define a random variable with an example. 2 M
2. Define reliability. 2 M
3. How is the reliability of a series system calculated? 2 M
4. What is the difference between a tie-set and a cut-set? 2 M
5. What is the reliability function  $R(t)$ ? 2 M
6. What is meant by the term mean time to failure (MTTF)? 2 M
7. What are the key properties of a Markov chain? 2 M
8. Define a continuous Markov process. 2 M
9. Define frequency in the context of reliability analysis. 2 M
10. What is the difference between network reduction techniques and exact reliability evaluation methods? 2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) How can the Weibull distribution be used to model failure rates in engineering systems? Provide an example. 5M
- ii) Solve a problem involving the computation of probabilities using the exponential distribution. 5M

**OR**

11. B). Deduce the expression for reliability function in terms of Hazard rate. 10M
12. A). Derive the expression for reliability evaluation of series and parallel systems. 10M

**OR**

12. B). i) Explain conditional probability method for reliability evaluation of non-series- parallel systems. 5M
- ii) Evaluate the reliability of the system given in Fig. 1. Also derive the expression used. Reliability of each component is indicated in the Fig. 1. 5M

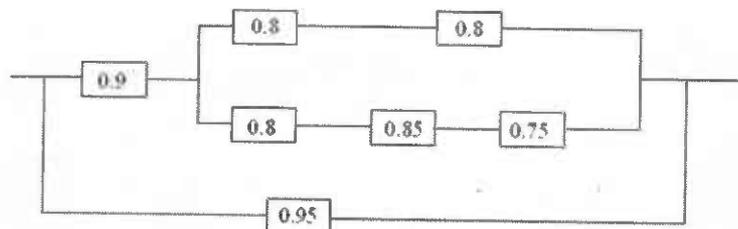


Fig. 1

(P.T.O.)

13. A). Tabulate the relationship between  $f(t)$ ,  $F(t)$ ,  $R(t)$  and  $h(t)$ . 10M

OR

13. B). i) A system is composed of three components. Component 1 is in series with the parallel combination of components 2 and 3. Given  $\lambda_1=2$  failures per year and  $\lambda_2=\lambda_3=3$  failures/year. Calculate the reliability and MTTF of the system for a mission time of 1000 hours. 5M

ii) Derive an expression for MTTF of Parallel System. 5M

14. A). i) Derive an expression for number of time intervals the system has been spent in various states before reaching absorbing state. 5M

ii) How absorbing states are useful in reliability evaluation? 5M

OR

14. B). Explain Markov process for reliability evaluation of repairable systems. 10M

15. A). Discuss the application of frequency and duration concepts to multi-state systems. Provide a worked-out numerical example. 10M

OR

15. B). i) Find the basic probability indices of Series-Parallel system shown in Fig. 2 using Network reduction method. Assume Failure rate and repair time of each component as 0.5 f/hr, 5 hrs respectively. 5M

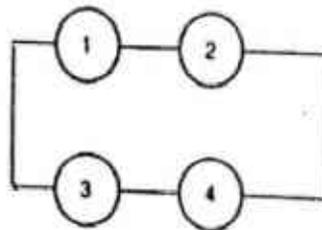


Fig.2

ii) Explain Common Mode Failures with its state diagrams. 5M

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