CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination	:	B.Tech V Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Power System Protection
Course Code	:	A402309
Branch	:	Electrical & Electronics Engineering
Date & Session	:	27-11-2025 AN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	Define Recovery Rate of Rise of Restriking Voltage (RRRV).	1 M
2.	List the merits of SF6 circuit breaker over air-blast type.	1 M
3.	State the advantages of microprocessor-based relays.	1 M
4.	What is a Directional Overcurrent Relay?	1 M
5.	Define Percentage Differential Protection.	1 M
6.	Write the use of carrier current protection.	1 M
7.	State the purpose of neutral grounding.	1 M
8.	What are Arcing Grounds?	1 M
9.	State the purpose of Lightning Arresters.	1 M
10.	Define Impulse Ratio.	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	i) Define a circuit breaker and explain its elementary principle of arc interruption.		5M
	ii) Explain the term current chopping and its effect on circuit performance.		5M

OR

11. B).	Explain the construction and operation of SF6 Circuit Breaker with neat diagram and mention its advantages.	10M

12. A).	Explain Universal Torque Equation of distance relays and sketch characteristics for Impedance, Reactance, and Mho relays.	10M

OR

12. B).	Discuss the differences between static and electromagnetic relays and write the advantages of static relays.	10M

13. A).	Explain in detail the protection schemes of transformers using differential and Buchholz relays.	10M

OR

13. B).	Explain in detail the protection scheme for stator of generator.	10M

(P.T.O..)

14. A). Describe solid, resistance, and reactance grounding methods and state their applications. 10M

OR

14. B). Explain resonant grounding using arc suppression coil (Peterson coil) and its function in eliminating arcing ground faults. 10M

15. A). Explain the working principle of Zinc-Oxide Lightning Arrester and its V–I characteristics. 10M

OR

15. B). Define and explain the concept of insulation coordination. How are BIL, impulse ratio, and protective margins chosen? 10M

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Examination	:	B.Tech V Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Power Electronics
Course Code	:	A402306
Branch	:	Electrical & Electronics Engineering
Date & Session	:	29-11-2025 AN　　　　　Duration: 3 hours　　　　　Max. Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries ONE mark.　　　　　　　　　10x1=10M

1. Why turn ON time is less than turn OFF time in SCR?　　　　　　　　　1 M
2. Draw the switching characteristics of power IGBT.　　　　　　　　　1 M
3. What are the drawbacks of source inductance on the performance of phase controlled rectifiers?　　　　　　　　　1 M
4. What is average output voltage of single phase full converter at $\alpha = 30^0$ at Vs=230V, 50Hz ?　　　　　1 M
5. Write the any two advantages of buck-boost converter　　　　　　　　　1 M
6. List any two applications of choppers.　　　　　　　　　1 M
7. What are the advantages of 120^0 inverter over 180^0 inverter?　　　　　　　　　1 M
8. Mention the advantages of sinusoidal pulse width modulation control.　　　　　　　　　1 M
9. List any two disadvantages of the cyclo-converters.　　　　　　　　　1 M
10. List any two applications of the AC voltage controllers.　　　　　　　　　1 M

PART-B
Answer the following. Each question carries TEN Marks.　　　　　　　5x10=50M

11.A).   i) Draw the V-I characteristics of SCR and explain it briefly.　　　　　　　6M
      ii) Compare power MOSFET and IGBT.　　　　　　　4M

OR

11. B).   i) Describe the operation of a Uni junction Transistor (UJT) as a trigger source in power electronic circuits.　　　　　　　5M

      ii) Draw the dynamic characteristics of a SCR and explain the importance of gate drive circuit.　　　　　　　5M

12. A).   Describe the operation of bridge type single phase fully controlled converter with R-L load and derive the average, RMS output voltage expressions.　　　　　　　10M

OR

12. B).   Explain with neat circuit diagram and associated waveforms, operation of a single phase half-controlled converter with RLE load.　　　　　　　10M

13. A).   i) A buck-boost converter has the input voltage of 12 V and it operates at 20 kHz, when the average output voltage is 24 V, the average load current is 1.2 A, it is having L = 300 µH, C = 150 µF. Find duty cycle, ripple current through the inductor, ripple voltage and critical values of L and C.　　　　　　　6M

      ii) Discuss the principle of operation of Buck-Boost converter.　　　　　　　4M

(P.T.O.)

OR

13. B). Investigate the power circuit of a Type A chopper. Provide a detailed analysis of its operation and waveforms at steady state. Include expressions for the output voltage, input current, and duty ratio. 10M

14. A). Explain the working of a single phase full bridge Inverter with RL load. Draw the relevant output waveforms. 10M

OR

14. B). Explain the principle of operation of three-phase bridge inverter with 180^0 conduction mode with necessary wave forms and circuit. 10M

15. A). i) With neat sketch explain Single phase AC voltage controller for RL-load. Derive RMS load voltage and current. 6M

ii) A single phase full –wave ac voltage controller is connected with a load of $R = 10\Omega$ with an input voltage of 230 V, 50 Hz. When the firing angle of thyristors is 45^0, determine i) power output at load ii) average value of thyristor current. 4M

OR

15. B). Describe the classification of single-phase cyclo-converters and also Discuss the operation of step down bridge type single-phase cyclo-converters. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech V Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Microprocessors & Microcontrollers
Course Code	:	A402312
Branch	:	Electrical & Electronics Engineering
Date & Session	:	02-12-2025 AN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark. 10x1=10M

1.	What are the different types of Interrupts in 8086.	1 M
2.	List the basic components of an Instruction.	1 M
3.	What is Mode 0 in 8255 ?	1 M
4.	What is the need for A/D Converter?	1 M
5.	Define Serial Communication.	1 M
6.	Define Prototyping.	1 M
7.	List out the external interrupts of 8051 microcontroller.	1 M
8.	What is PCON register in 8051 microcontrollers?	1 M
9.	What is the difference between matrix keyboard and a simple keyboard?	1 M
10.	What is the function of DAC	1 M

PART-B
Answer the following. Each question carries TEN Marks. 5x10=50M

11.A).	Interpret the functionality of the following 8086 pins. i) ALE ii) DEN iii) BHE iv) READY v) S2-S0	10M
	OR	
11. B).	Demonstrate the minimum mode operations of 8086 with timing diagram for write operation.	10M
12. A).	Explain with a neat diagram the interfacing of 8257 DMA with a 8086 microprocessor.	10M
	OR	
12. B).	Describe the functional blocks of 8259 Interrupt controller.	10M
13. A).	With a neat block diagram explain the architecture and working of a USART.	10M
	OR	
13. B).	Compare and contrast RS-232 and IEEE-488 communication standards.	10M
14. A).	i) List out the different addressing modes used in 8051.	5M
	ii) List the features of 8051 microcontroller and compare it with 8086 microprocessor.	5M
	OR	
14. B).	Explain the Interrupt Enable Register and Interrupt Priority Register.	10M
15. A).	Explain with a neat diagram the interfacing of a stepper motor with 8051 microcontroller	10M
	OR	
15. B).	Explain with a block diagram, the interfacing of ADC with 8051	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech V Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Utilization of Electrical Energy
Course Code	:	A402402
Branch	:	Electrical & Electronics Engineering
Date & Session	:	04-12-2025 AN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	List any two types of electric drives.	1 M
2.	What factors are considered for the choice of a motor?	1 M
3.	What is dielectric heating?	1 M
4.	What is the function of welding electrodes?	1 M
5.	What is a polar curve?	1 M
6.	What is meant by flood lighting?	1 M
7.	Name any two systems of track electrification.	1 M
8.	What is regenerative braking?	1 M
9.	Define braking retardation.	1 M
10.	Define tractive effort.	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	Explain the different types of electric drives with neat diagrams and suitable applications.	10M

OR

11. B).	Explain the concept of continuous, intermittent, and variable loads in electric drives. How do these load conditions influence motor selection?	10M
12. A).	What is resistance heating. Describe various methods in resistance heating?	10M

OR

12. B).	Describe with relevant diagrams, the three different types of resistance welding.	10M
13. A).	i) State and explain inverse square law of Illumination.	5M
	ii) A 250V lamp takes a current of 1A and produces a total flux of 400 lumens Determine: a) MSCP of the lamp b) the efficiency of the lamp.	5M

OR

13. B).	Describe the construction and working principle of fluorescent lamp. Discuss advantages and disadvantages of this lamp.	10M
14. A).	Explain the different systems of electric traction and methods of track electrification with neat diagrams.	10M

OR

14. B).	Describe different methods of electric braking with neat sketches.	10M
15. A).	Derive the expression for tractive effort required for acceleration, gradient, and curve resistance.	10M

OR

15. B).	Explain how to calculate specific energy consumption for a given run.	10M

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Examination	:	B.Tech V Semester Regular & Supplementary Examinations Nov/Dec-2025
Course Name	:	Control Systems
Course Code	:	A402305
Branch	:	Electrical & Electronics Engineering
Date & Session	:	06-12-2025 AN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	What is the difference between open loop control and a closed loop control system?	1 M
2.	What is the difference between AC servo motor and DC servo motor?	1 M
3.	What are the effects of PI controller	1 M
4.	List the time domain specifications.	1 M
5.	How Routh –Hurwitz criterion is helpful in determining the stability of a control system?	1 M
6.	Give the centroid for root locus of a system whose open loop transfer function is $K/S(S+1)(S+5)$.	1 M
7.	Give the limitations of Nyquist stability criterion.	1 M
8.	Define lead compensator.	1 M
9.	Define Controllability.	1 M
10.	What are the advantages of state space analysis?	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	i) Derive the transfer function for Armature controlled DC servo motor.	5M
	ii) What is the basis for framing the rules of block diagram reduction technique? Explain.	5M

OR

11. B).	Describe the construction and operating principle of synchro transmitter with neat diagrams.	10M

12. A).	i) What is integral control action? What are the advantages and disadvantages of integral controller?	5M
	ii) A unity feedback control system has an open loop transfer function $G(S) = 10/S(S+2)$. Find the rise time, percentage over shoot, peak time and settling time.	5M

OR

12. B).	i) Derive the response of second order under damped system with unit step response.	5M
	ii) Obtain the unit step response of a unity feedback system whose open loop transfer function $G(S) = 4/S(S+5)$.	5M

13. A).	Sketch the root locus for the open loop transfer function of unity feedback control system given below: $G(S) H(S) =K/S(S+2)(S+4)$.	10M

(P.T.O..)

13. B). i) Explain how find out the breakaway point on the root locus. 5M

ii) For the following characteristic equation $S^4 + S^3 + 5S^2 + 4S + 4 = 0$ Find the location of the roots on the complex s-plane and determine the stability of the system. 5M

14. A). Discuss in detail about the procedural steps to design a phase lag compensator in frequency domain. 10M

14. B). A unity feedback control system has an open loop transfer function given by

$$G(s)H(s) = \frac{10}{S(S+3)(S+6)}$$ draw Nyquist diagram and determine stability. 10M

15. A). The state variable formulation of the system is given by 10M

$$[\dot{X}] = \begin{bmatrix} -3 & 2 \\ -1 & 0 \end{bmatrix} [X] + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \ and \ Y = [1 \quad 0]X$$

Find (i) Transfer function (ii) State transition matrix

15. B). The state space representation of a system is given below 10M

$$\begin{bmatrix} \dot{X_1} \\ \dot{X_2} \\ \dot{X_3} \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} u \ and \ y = [10 \quad 5 \quad 1] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

Check for controllability and observability

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