

MULTIPLE CHOICE QUESTIONS

UNIT I – POWER DEVICES

1. IGBT stands for

- (a) Insulated Gate Bipolar Transistor
- (b) Integrated Gate Bipolar Transistor
- (c) Insulated Gate Base Transistor
- (d) Integrated Gate Base Transistor

Answer : (a) Insulated Gate Bipolar Transistor

2. The IGBT is a combination of

- (a) MOSFET and BJT
- (b) SCR and TRIAC
- (c) UJT and SCR
- (d) DIAC and TRIAC

Answer : (a) MOSFET and BJT

3. The input terminal of an IGBT is called

- (a) Gate
- (b) Base
- (c) Collector
- (d) Anode

Answer : (a) Gate

4. The output terminals of an IGBT are

- (a) Collector and Emitter

- (b) Drain and Source
- (c) Anode and Cathode
- (d) Base and Collector

Answer : (a) Collector and Emitter

5. Power MOSFET is a

- (a) Voltage controlled device
- (b) Current controlled device
- (c) Temperature controlled device
- (d) Frequency controlled device

Answer : (a) Voltage controlled device

6. Power transistor is mainly used as a

- (a) Switch
- (b) Fuse
- (c) Transformer
- (d) Filter

Answer : (a) Switch

7. GTO stands for

- (a) Gate Turn-Off Thyristor
- (b) Gate Turn-On Transistor
- (c) General Turn-Off Transistor
- (d) Gate Triggered Oscillator

Answer : (a) Gate Turn-Off Thyristor

8. SCR stands for

- (a) Silicon Controlled Rectifier
- (b) Silicon Current Regulator
- (c) Single Controlled Rectifier
- (d) Semiconductor Current Rectifier

Answer : (a) Silicon Controlled Rectifier

9. SCR is a

- (a) Thyristor
- (b) Transistor
- (c) Diode
- (d) Resistor

Answer : (a) Thyristor

10. The V-I characteristics of SCR are represented between

- (a) Anode voltage and anode current
- (b) Gate voltage and gate current
- (c) Collector voltage and collector current
- (d) Drain voltage and drain current

Answer : (a) Anode voltage and anode current

11. Which terminal is used to trigger an SCR?

- (a) Gate
- (b) Cathode

(c) Anode

(d) Base

Answer : (a) Gate

12. An SCR starts conducting when

(a) Gate pulse is applied

(b) Supply is removed

(c) Load is disconnected

(d) Gate is open

Answer : (a) Gate pulse is applied

13. The turn-ON process of SCR is called

(a) Triggering

(b) Commutation

(c) Rectification

(d) Amplification

Answer : (a) Triggering

14. Turn-OFF of SCR is known as

(a) Commutation

(b) Triggering

(c) Rectification

(d) Amplification

Answer : (a) Commutation

15. The gate of an SCR requires

- (a) Positive pulse
- (b) Negative pulse
- (c) AC supply
- (d) High voltage

Answer : (a) Positive pulse

16. The gate terminal of IGBT draws

- (a) Very small current
- (b) High current
- (c) Large power
- (d) No voltage

Answer : (a) Very small current

17. Power MOSFET is widely used because of its

- (a) High switching speed
- (b) Large size
- (c) High weight
- (d) Low efficiency

Answer : (a) High switching speed

18. Which device can be turned OFF using the gate terminal?

- (a) GTO
- (b) SCR
- (c) Diode

(d) TRIAC

Answer : (a) GTO

19. IGBT is mainly used in

(a) Power control circuits

(b) Audio circuits

(c) Radio receivers

(d) Oscillators

Answer : (a) Power control circuits

20. The symbol of SCR has

(a) Three terminals

(b) Two terminals

(c) Four terminals

(d) Five terminals

Answer : (a) Three terminals

21. Which power device has Drain and Source terminals?

(a) Power MOSFET

(b) SCR

(c) IGBT

(d) GTO

Answer : (a) Power MOSFET

22. The collector terminal is present in

- (a) IGBT
- (b) SCR
- (c) MOSFET
- (d) DIAC

Answer : (a) IGBT

23. The cathode terminal is present in

- (a) SCR
- (b) MOSFET
- (c) IGBT
- (d) BJT

Answer : (a) SCR

24. Which of the following is a power semiconductor device?

- (a) IGBT
- (b) Capacitor
- (c) Transformer
- (d) Relay

Answer : (a) IGBT

UNIT II - CONVERTERS AND CHOPPERS

1. A converter is used to convert

- (a) AC to DC
- (b) DC to AC
- (c) DC to DC
- (d) AC to AC

Answer : (a) AC to DC

2. A single-phase semi converter is also called a

- (a) Half-controlled converter
- (b) Fully controlled converter
- (c) Chopper
- (d) Inverter

Answer : (a) Half-controlled converter

3. A fully controlled bridge converter uses

- (a) Four SCRs
- (b) Two SCRs and two diodes
- (c) Four diodes
- (d) One SCR

Answer : (a) Four SCRs

4. The freewheeling diode is connected across

- (a) RL load
- (b) R load
- (c) SCR
- (d) Supply

Answer : (a) RL load

5. The main function of a freewheeling diode is to

- (a) Maintain load current continuity

(b) Increase supply voltage

(c) Reduce frequency

(d) Increase resistance

Answer : (a) Maintain load current continuity

6. A chopper converts

(a) DC to DC

(b) AC to DC

(c) DC to AC

(d) AC to AC

Answer : (a) DC to DC

7. A step-down chopper is also called

(a) Buck converter

(b) Boost converter

(c) Inverter

(d) Rectifier

Answer : (a) Buck converter

8. A step-up chopper is also called

(a) Boost converter

(b) Buck converter

(c) Inverter

(d) Cycloconverter

Answer : (a) Boost converter

9. The output voltage of a step-down chopper is

- (a) Less than input voltage
- (b) Equal to input voltage
- (c) Greater than input voltage
- (d) Zero

Answer : (a) Less than input voltage

10. The output voltage of a step-up chopper is

- (a) Greater than input voltage
- (b) Less than input voltage
- (c) Equal to input voltage
- (d) Zero

Answer : (a) Greater than input voltage

11. AC chopper converts

- (a) Fixed AC to variable AC
- (b) AC to DC
- (c) DC to DC
- (d) DC to AC

Answer : (a) Fixed AC to variable AC

12. Chopper drives are mainly used for

- (a) DC motor control
- (b) Lighting circuits

(c) Audio circuits

(d) Amplifiers

Answer : (a) DC motor control

13. In a semi converter, the number of SCRs used is

(a) Two

(b) Four

(c) One

(d) Three

Answer : (a) Two

14. The load current in an RL load continues due to

(a) Inductance

(b) Resistance

(c) Capacitance

(d) Supply voltage

Answer : (a) Inductance

15. The freewheeling diode conducts when

(a) SCRs are OFF

(b) SCRs are ON

(c) Supply is disconnected

(d) Load is removed

Answer : (a) SCRs are OFF

16. Chopper operation is based on

- (a) Rapid switching
- (b) Amplification
- (c) Oscillation
- (d) Modulation

Answer : (a) Rapid switching

17. A converter with only SCRs is called

- (a) Fully controlled converter
- (b) Semi converter
- (c) Chopper
- (d) Inverter

Answer : (a) Fully controlled converter

18. Which load requires a freewheeling diode?

- (a) RL load
- (b) R load
- (c) Capacitive load
- (d) Lamp load

Answer : (a) RL load

19. The output of a converter is

- (a) DC
- (b) AC
- (c) Pulsating AC

(d) High frequency AC

Answer : (a) DC

20. A step-up chopper increases

(a) Output voltage

(b) Frequency

(c) Resistance

(d) Current only

Answer : (a) Output voltage

21. The output voltage of a chopper can be controlled by changing

(a) Duty cycle

(b) Resistance

(c) Frequency only

(d) Load current

Answer : (a) Duty cycle

22. AC choppers are used for

(a) AC power control

(b) DC power control

(c) Signal amplification

(d) Communication

Answer : (a) AC power control

23. Choppers are widely used in

- (a) Electric vehicles
- (b) Radio receivers
- (c) Audio systems
- (d) Televisions

Answer : (a) Electric vehicles

24. The converter output waveform is

- (a) Pulsating DC
- (b) Pure AC
- (c) Sine wave
- (d) Square wave

Answer : (a) Pulsating DC

UNIT III – INVERTERS AND POWER SUPPLIES

1. An inverter converts

- (a) DC to AC
- (b) AC to DC
- (c) AC to AC
- (d) DC to DC

Answer : (a) DC to AC

2. The output of an inverter is

- (a) AC
- (b) DC
- (c) Pulsating DC

(d) Constant DC

Answer : (a) AC

3. Which of the following is a single-phase inverter?

(a) Full bridge inverter

(b) Half-wave rectifier

(c) Chopper

(d) Converter

Answer : (a) Full bridge inverter

4. McMurray inverter is a type of

(a) Inverter

(b) Converter

(c) Chopper

(d) Rectifier

Answer : (a) Inverter

5. The output voltage of an inverter can be controlled by

(a) Voltage control method

(b) Resistance control

(c) Current control

(d) Frequency control only

Answer : (a) Voltage control method

6. A sine wave output from an inverter is obtained to

- (a) Improve output waveform
- (b) Increase resistance
- (c) Reduce supply voltage
- (d) Increase current only

Answer : (a) Improve output waveform

7. SMPS stands for

- (a) Switched Mode Power Supply
- (b) Single Mode Power Supply
- (c) Switched Main Power System
- (d) Standard Mode Power Supply

Answer : (a) Switched Mode Power Supply

8. SMPS is mainly used to

- (a) Provide regulated DC output
- (b) Generate AC power
- (c) Increase frequency only
- (d) Produce radio signals

Answer : (a) Provide regulated DC output

9. One advantage of SMPS is

- (a) High efficiency
- (b) Large size
- (c) High power loss
- (d) Heavy weight

Answer : (a) High efficiency

10. UPS stands for

- (a) Uninterrupted Power Supply
- (b) Universal Power Supply
- (c) Unified Power System
- (d) Utility Power Source

Answer : (a) Uninterrupted Power Supply

11. The main purpose of a UPS is to

- (a) Provide backup power
- (b) Increase voltage
- (c) Reduce frequency
- (d) Amplify signals

Answer : (a) Provide backup power

12. Online UPS supplies power to the load through

- (a) Inverter
- (b) Transformer only
- (c) Battery only
- (d) Rectifier only

Answer : (a) Inverter

13. Offline UPS supplies power from the battery

- (a) During power failure

- (b) All the time
- (c) During normal supply
- (d) Never

Answer : (a) During power failure

14. SMPS is preferred because it has

- (a) High efficiency
- (b) High heat generation
- (c) Large transformer
- (d) Low efficiency

Answer : (a) High efficiency

15. The output waveform of a full bridge inverter is

- (a) AC
- (b) DC
- (c) Pulsating DC
- (d) Ripple DC

Answer : (a) AC

16. Which device is used to provide uninterrupted power?

- (a) UPS
- (b) Converter
- (c) Chopper
- (d) Transformer

Answer : (a) UPS

17. An inverter is widely used in

- (a) UPS
- (b) Rectifier
- (c) Amplifier
- (d) Oscillator

Answer : (a) UPS

18. Which power supply has better efficiency?

- (a) SMPS
- (b) Linear power supply
- (c) Battery only
- (d) Transformer only

Answer : (a) SMPS

19. During a power failure, the battery supplies power through the

- (a) Inverter
- (b) Converter
- (c) Rectifier
- (d) Chopper

Answer : (a) Inverter

20. The full form of UPS indicates

- (a) Continuous power supply
- (b) Variable power supply

(c) High voltage supply

(d) Low current supply

Answer : (a) Continuous power supply

21. A sine wave output is preferred because it

(a) Reduces waveform distortion

(b) Increases heating

(c) Reduces efficiency

(d) Increases ripple

Answer : (a) Reduces waveform distortion

22. Which of the following is a power supply?

(a) SMPS

(b) Inverter

(c) Chopper

(d) Converter

Answer : (a) SMPS

23. Which UPS supplies power to the load continuously through the inverter?

(a) Online UPS

(b) Offline UPS

(c) Standby UPS

(d) Battery charger

Answer : (a) Online UPS

24. The main function of a power supply is to

- (a) Provide required electrical power
- (b) Amplify signals
- (c) Generate pulses
- (d) Produce oscillations

Answer : (a) Provide required electrical power

UNIT IV – PLC AND ROBOTICS

PART – A

MCQs

1. PLC stands for

- (a) Programmable Logic Controller
- (b) Program Logic Circuit
- (c) Power Logic Controller
- (d) Process Logic Circuit

Answer : (a) Programmable Logic Controller

2. The main function of a PLC is to

- (a) Control industrial processes
- (b) Increase voltage
- (c) Convert AC to DC
- (d) Amplify signals

Answer : (a) Control industrial processes

3. The brain of a PLC is the

- (a) CPU
- (b) Memory
- (c) Input module
- (d) Output module

Answer : (a) CPU

4. Which unit stores the program in a PLC?

- (a) Memory
- (b) CPU
- (c) Input module
- (d) Output module

Answer : (a) Memory

5. Which module receives signals from sensors?

- (a) Input module
- (b) Output module
- (c) CPU
- (d) Power supply

Answer : (a) Input module

6. Which module sends signals to actuators?

- (a) Output module
- (b) Input module
- (c) CPU
- (d) Memory

Answer : (a) Output module

7. Ladder programming is used in

- (a) PLC
- (b) Microprocessor
- (c) Inverter
- (d) Chopper

Answer : (a) PLC

8. Logic gate programming in PLC is done using

- (a) Ladder diagram
- (b) Circuit diagram
- (c) Block diagram
- (d) Flowchart

Answer : (a) Ladder diagram

9. A timer in PLC is used to

- (a) Introduce time delay
- (b) Increase voltage
- (c) Store data
- (d) Amplify signals

Answer : (a) Introduce time delay

10. Conveyor control is a common application of

- (a) PLC

- (b) UPS
- (c) SMPS
- (d) Converter

Answer : (a) PLC

11. A robot is mainly used to

- (a) Perform automated tasks
- (b) Increase voltage
- (c) Convert AC to DC
- (d) Amplify signals

Answer : (a) Perform automated tasks

12. The arm of a robot ends with an

- (a) End effector
- (b) Sensor
- (c) Actuator
- (d) Controller

Answer : (a) End effector

13. The main function of an end effector is to

- (a) Perform the required task
- (b) Store data
- (c) Control the CPU
- (d) Supply power

Answer : (a) Perform the required task

14. Which end effector is used to hold an object?

- (a) Gripper
- (b) Sensor
- (c) Motor
- (d) Timer

Answer : (a) Gripper

15. Gripping techniques are associated with

- (a) End effectors
- (b) CPU
- (c) Memory
- (d) PLC timer

Answer : (a) End effectors

16. Sensors in robotics are used to

- (a) Detect physical quantities
- (b) Store programs
- (c) Increase voltage
- (d) Produce sound

Answer : (a) Detect physical quantities

17. The PLC block diagram includes

- (a) CPU
- (b) Transformer only

(c) Rectifier only

(d) Amplifier

Answer : (a) CPU

18. Which component processes input signals in a PLC?

(a) CPU

(b) Memory

(c) Output module

(d) Sensor

Answer : (a) CPU

19. Robotics is widely used in

(a) Industrial automation

(b) Audio systems

(c) Television receivers

(d) Radio communication

Answer : (a) Industrial automation

20. PLC replaces

(a) Relay control circuits

(b) Transformers

(c) Motors

(d) Batteries

Answer : (a) Relay control circuits

21. A robot sensor provides

- (a) Feedback
- (b) Power
- (c) Cooling
- (d) Communication

Answer : (a) Feedback

22. Conveyor control is generally programmed using

- (a) Ladder diagram
- (b) Flowchart
- (c) Circuit diagram
- (d) Truth table

Answer : (a) Ladder diagram

23. The input devices of a PLC include

- (a) Switches and sensors
- (b) Lamps only
- (c) Motors only
- (d) Relays only

Answer : (a) Switches and sensors

24. The output devices of a PLC include

- (a) Motors and lamps
- (b) Sensors only
- (c) CPU only

(d) Memory only

Answer : (a) Motors and lamps

UNIT V – MEDICAL ELECTRONICS

PART – A

MCQs

1. Bioelectric potential is generated by

- (a) Living cells
- (b) Transformer
- (c) Resistor
- (d) Capacitor

Answer : (a) Living cells

2. The resting potential exists when the cell is

- (a) At rest
- (b) Stimulated
- (c) Conducting
- (d) Heated

Answer : (a) At rest

3. The action potential is produced when a cell is

- (a) Stimulated
- (b) At rest
- (c) Disconnected

(d) Cooled

Answer : (a) Stimulated

4. Electrodes are used to

(a) Detect bioelectric signals

(b) Increase voltage

(c) Reduce current

(d) Store energy

Answer : (a) Detect bioelectric signals

5. ECG stands for

(a) Electrocardiogram

(b) Electroencephalogram

(c) Electromyogram

(d) Electroretinogram

Answer : (a) Electrocardiogram

6. ECG records the electrical activity of the

(a) Heart

(b) Brain

(c) Muscles

(d) Lungs

Answer : (a) Heart

7. EMG stands for

- (a) Electromyogram
- (b) Electrocardiogram
- (c) Electroencephalogram
- (d) Electrogastrogram

Answer : (a) Electromyogram

8. EMG records the electrical activity of

- (a) Muscles
- (b) Heart
- (c) Brain
- (d) Kidneys

Answer : (a) Muscles

9. ECG recorder is classified as a

- (a) Diagnostic equipment
- (b) Therapeutic equipment
- (c) Surgical equipment
- (d) Laboratory equipment

Answer : (a) Diagnostic equipment

10. EMG recorder is an example of

- (a) Diagnostic equipment
- (b) Therapeutic equipment
- (c) Imaging equipment
- (d) Monitoring equipment

Answer : (a) Diagnostic equipment

11. A pacemaker is used to

- (a) Regulate heart rate
- (b) Measure blood pressure
- (c) Measure body temperature
- (d) Record brain activity

Answer : (a) Regulate heart rate

12. An external pacemaker belongs to

- (a) Therapeutic equipment
- (b) Diagnostic equipment
- (c) Imaging equipment
- (d) Laboratory equipment

Answer : (a) Therapeutic equipment

13. A DC defibrillator is used to

- (a) Restore normal heart rhythm
- (b) Measure heart rate
- (c) Record ECG
- (d) Measure pulse rate

Answer : (a) Restore normal heart rhythm

14. Peritoneal dialysis is used for patients with

- (a) Kidney failure

- (b) Heart disease
- (c) Lung disease
- (d) Brain disorders

Answer : (a) Kidney failure

15. The heart-lung machine is used during

- (a) Heart surgery
- (b) Brain surgery
- (c) Eye surgery
- (d) Dental treatment

Answer : (a) Heart surgery

16. The block diagram of an ECG recorder includes

- (a) Amplifier
- (b) Transformer
- (c) Oscillator
- (d) Converter

Answer : (a) Amplifier

17. The block diagram of an EMG recorder includes

- (a) Amplifier
- (b) Inverter
- (c) Chopper
- (d) UPS

Answer : (a) Amplifier

18. Electrodes are connected to the

- (a) Patient's body
- (b) Power supply
- (c) Display unit
- (d) Speaker

Answer : (a) Patient's body

19. Diagnostic equipment is mainly used to

- (a) Detect diseases
- (b) Treat diseases
- (c) Generate power
- (d) Control robots

Answer : (a) Detect diseases

20. Therapeutic equipment is mainly used to

- (a) Treat patients
- (b) Detect diseases
- (c) Measure voltage
- (d) Record signals

Answer : (a) Treat patients

21. Resting potential is present across the

- (a) Cell membrane
- (b) Battery

- (c) Resistor
- (d) Transformer

Answer : (a) Cell membrane

22. Action potential is produced due to

- (a) Stimulation of the cell
- (b) Cooling of the cell
- (c) Disconnecting the cell
- (d) Increasing resistance

Answer : (a) Stimulation of the cell

23. Which equipment delivers an electrical shock to the heart?

- (a) DC Defibrillator
- (b) ECG Recorder
- (c) EMG Recorder
- (d) Pacemaker

Answer : (a) DC Defibrillator

24. Which equipment temporarily replaces the function of the heart and lungs?

- (a) Heart-lung machine
- (b) ECG Recorder
- (c) EMG Recorder
- (d) Pacemaker

Answer : (a) Heart-lung machine

ANALYTICAL TYPE MCQs

UNIT I – POWER DEVICES

1. Assertion (A): IGBT is suitable for power switching applications.

Reason (R): IGBT combines the features of MOSFET and BJT.

- a) Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
- b) Both A and R are true, but R is not the correct explanation of A
- c) A is true, but R is false
- d) A is false, but R is true

Answer: a

2. Arrange the following devices according to their switching speed, from higher to lower.

- 1. Power MOSFET
- 2. SCR
- 3. IGBT
- 4. Power Transistor

- a) $1 \rightarrow 3 \rightarrow 4 \rightarrow 2$
- b) $2 \rightarrow 4 \rightarrow 3 \rightarrow 1$
- c) $3 \rightarrow 1 \rightarrow 4 \rightarrow 2$
- d) $4 \rightarrow 2 \rightarrow 3 \rightarrow 1$

Answer: a

3. Select the Correct Statements

Consider the following statements:

- 1. IGBT has Gate, Collector and Emitter terminals.
- 2. Power MOSFET has Gate, Drain and Source terminals.
- 3. GTO can be turned OFF using the gate.
- 4. SCR has four terminals.

Which statements are correct?

- a) 1, 2 and 3 only

- b) 1 and 4 only
- c) 2 and 4 only
- d) 1, 2, 3 and 4

Answer: a

4. Arrange the Events

Arrange the following events during gate triggering of an SCR in the correct sequence.

1. Gate pulse is applied.
2. SCR starts conducting.
3. Anode current flows through the load.
4. SCR remains in the ON state.

- a) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$
- b) $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$
- c) $1 \rightarrow 3 \rightarrow 2 \rightarrow 4$
- d) $3 \rightarrow 1 \rightarrow 2 \rightarrow 4$

Answer: a

5. Spot the Error

A student states:

"A GTO can be turned ON and OFF by applying suitable signals to its gate terminal."

Error: There is no error. A GTO can be turned ON and turned OFF through the gate terminal.

Answer: No Error

6. A circuit requires a power device that can be turned OFF by applying a gate signal.

Which device is suitable?

- a) GTO
- b) SCR
- c) Power diode
- d) Power transistor

Answer: a

UNIT II – CONVERTERS AND CHOPPERS

1. Assertion (A): A freewheeling diode is used with an RL load.

Reason (R): It provides a path for the inductive load current when the main device is OFF.

- a) Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
- b) Both A and R are true, but R is not the correct explanation of A
- c) A is true, but R is false
- d) A is false, but R is true

Answer: a

2. Select the Correct Statements

- 1. A converter converts AC into DC.
- 2. A chopper converts DC into DC.
- 3. A step-down chopper gives an output voltage lower than the input voltage.
- 4. A step-up chopper gives an output voltage higher than the input voltage.

Which statements are correct?

- a) 1, 2 and 3 only
- b) 1, 2, 3 and 4
- c) 2 and 4 only
- d) 1 and 3 only

Answer: b

3. A DC motor requires a variable DC voltage for speed control. Which device is suitable?

- a) DC chopper
- b) Inverter
- c) AC chopper
- d) Transformer

Answer: a

4. Arrange the basic events of chopper operation in the correct sequence.

- 1. Chopper switch is turned ON.

2. DC supply is connected to the load.
3. Chopper switch is turned OFF.
4. Output voltage is controlled by switching.

- a) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$
- b) $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$
- c) $3 \rightarrow 1 \rightarrow 2 \rightarrow 4$
- d) $1 \rightarrow 3 \rightarrow 2 \rightarrow 4$

Answer: a

4. Spot the Error

A student states:

"A step-up chopper is used when the required output voltage is lower than the input voltage."

Error: A step-up chopper is used to obtain an output voltage higher than the input voltage.

5. An RL load is connected to a controlled converter. When the main SCR turns OFF, the load current needs another path.

Which component provides this path?

- a) Freewheeling diode
- b) Transformer
- c) Resistor
- d) Capacitor

Answer: a

6. Select the Correct Statements

1. A semi converter is a half-controlled converter.
2. A fully controlled bridge converter uses four controlled devices.
3. A freewheeling diode can be used with an RL load.
4. An AC chopper produces variable AC output.

Which statements are correct?

- a) 1 and 2 only

b) 1, 2 and 3 only

c) 1, 2, 3 and 4

d) 2 and 4 only

Answer: c

UNIT III – INVERTERS AND POWER SUPPLIES

1.Assertion (A): An inverter converts DC power into AC power.

Reason (R): The switching devices in an inverter are operated to obtain an alternating output.

a) Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A

b) Both A and R are true, but R is not the correct explanation of A

c) A is true, but R is false

d) A is false, but R is true

Answer: a

2. Select the Correct Statements

1. A full bridge inverter converts DC into AC.

2. McMurray inverter is an inverter circuit.

3. SMPS stands for Switched Mode Power Supply.

4. UPS provides uninterrupted power to a load.

Which statements are correct?

a) 1 and 2 only

b) 1, 2 and 3 only

c) 1, 2, 3 and 4

d) 2 and 4 only

Answer: c

3. Arrange the basic events during DC-to-AC conversion in an inverter.

1. DC supply is applied.

2. Switching devices operate alternately.

3. Load voltage changes polarity.

4. AC output is obtained.

a) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$

b) $2 \rightarrow 1 \rightarrow 4 \rightarrow 3$

c) $1 \rightarrow 3 \rightarrow 2 \rightarrow 4$

d) $3 \rightarrow 2 \rightarrow 1 \rightarrow 4$

Answer: a

4. Situation-Based Question

A battery-operated system requires AC output to operate an AC load.

Which circuit is required?

a) Inverter

b) Converter

c) Rectifier

d) DC chopper

Answer: a

5. Arrange the UPS Operation

Arrange the following events when an offline UPS operates during a power failure.

1. Mains power fails.

2. Battery supplies DC power.

3. Inverter converts DC into AC.

4. AC power is supplied to the load.

a) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$

b) $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$

c) $1 \rightarrow 3 \rightarrow 2 \rightarrow 4$

d) $3 \rightarrow 2 \rightarrow 1 \rightarrow 4$

Answer: a

6. Spot the Error

A student states:

"An offline UPS continuously supplies the load through the inverter even when mains power is available."

Error: In an offline UPS, the inverter supplies the load from the battery during power failure.

UNIT IV – PLC AND ROBOTICS

1. Assertion (A): PLC is widely used in industrial automation.

Reason (R): PLC can be programmed to control industrial operations.

- a) Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
- b) Both A and R are true, but R is not the correct explanation of A
- c) A is true, but R is false
- d) A is false, but R is true

Answer: a

2. Arrange the following steps in the correct sequence.

- 1. Input signal is received.
 - 2. CPU processes the program.
 - 3. Output signal is produced.
 - 4. Output device operates.
- a) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$
 - b) $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$
 - c) $1 \rightarrow 3 \rightarrow 2 \rightarrow 4$
 - d) $3 \rightarrow 2 \rightarrow 1 \rightarrow 4$

Answer: a

3. Select the Correct Statements

- 1. CPU is the main processing unit of PLC.
- 2. Memory stores the PLC program.
- 3. Input modules receive signals from field devices.
- 4. Output modules control output devices.

Which statements are correct?

- a) 1 and 2 only
- b) 1, 2 and 3 only
- c) 1, 2, 3 and 4
- d) 2 and 4 only

Answer: c

4. Arrange the Robot Operation

Arrange the following steps in a simple pick-and-place operation.

1. Sensor detects the object.
2. Robot moves towards the object.
3. Gripper holds the object.
4. Robot moves the object to the required position.

- a) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$
- b) $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$
- c) $1 \rightarrow 3 \rightarrow 2 \rightarrow 4$
- d) $3 \rightarrow 1 \rightarrow 2 \rightarrow 4$

Answer: a

5. Spot the Error

A student states:

"The output module of a PLC receives signals from sensors."

Error: The input module receives signals from sensors. The output module sends signals to output devices.

6. Situation-Based Question

A robot has to hold and move a workpiece.

Which component is used for gripping the workpiece?

- a) End effector
- b) Sensor
- c) CPU

d) Memory

Answer: a

UNIT V – MEDICAL ELECTRONICS

1. Assertion (A): ECG is classified as diagnostic equipment.

Reason (R): ECG records the electrical activity of the heart for diagnosis.

a) Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A

b) Both A and R are true, but R is not the correct explanation of A

c) A is true, but R is false

d) A is false, but R is true

Answer: a

2. Select the Correct Statements

1. Resting potential exists when a cell is at rest.

2. Action potential is produced when a cell is stimulated.

3. ECG records the electrical activity of the heart.

4. EMG records the electrical activity of muscles.

Which statements are correct?

a) 1 and 2 only

b) 1, 2 and 3 only

c) 1, 2, 3 and 4

d) 2 and 4 only

Answer: c

3. Arrange the following steps in the correct sequence.

1. Electrodes detect bioelectric signals.

2. The signal is amplified.

3. The ECG waveform is recorded.

4. The waveform is displayed.

a) 1 → 2 → 3 → 4

b) $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$

c) $1 \rightarrow 3 \rightarrow 2 \rightarrow 4$

d) $3 \rightarrow 2 \rightarrow 1 \rightarrow 4$

Answer: a

4. A doctor wants to record the electrical activity of a patient's muscles.

Which equipment should be used?

a) EMG recorder

b) ECG recorder

c) External pacemaker

d) DC defibrillator

Answer: a

5. Spot the Error

A student states:

"A DC defibrillator is a diagnostic equipment used to record the electrical activity of the heart."

Error: A DC defibrillator is therapeutic equipment used to restore normal heart rhythm.

6. Situation-Based Question

During heart surgery, temporary support of heart and lung functions is required.

Which equipment is used?

a) Heart-lung machine

b) ECG recorder

c) EMG recorder

d) External pacemaker

Answer: a

DESCRIPTIVE QUESTIONS

UNIT I - POWER DEVICES

1. Draw the V-I characteristics of IGBT and explain.
2. Write a note on GTO.
3. Explain the construction and operation of a Power MOSFET.
4. Describe the switching characteristics of SCR with a neat diagram.
5. Explain the turn-ON and turn-OFF methods of SCR.

Analytical Descriptive Questions

6. Match the Following (5 Marks)

Column A	Column B
(i) IGBT	(a) Gate Turn-Off Thyristor
(ii) SCR	(b) Silicon Controlled Rectifier
(iii) GTO	(c) Voltage-controlled power device
(iv) Power MOSFET	(d) Combination of MOSFET and BJT
(v) Gate Triggering	(e) Method used to turn ON SCR

7. Identify the Power Devices (5 Marks)

Observe the symbols of the following devices (IGBT, SCR, Power MOSFET, and GTO) and answer the following:

- a) Identify each device. (2 Marks)
- b) Write one application of each device. (2 Marks)
- c) State which device can be turned OFF using the gate terminal. (1 Mark)

UNIT II – CONVERTERS AND CHOPPERS

1. Explain the operation of a single-phase semi-controlled converter with RL load.
2. Describe the working of a single-phase fully controlled bridge converter with R load.
3. Explain the operation of a single-phase fully controlled bridge converter with RL load.

4. Discuss the operation of a step-down chopper.
5. Write a note on AC chopper.

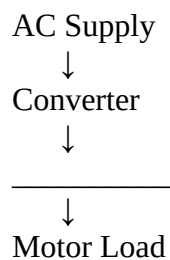
Analytical Descriptive Questions

6. Match the Following (5 Marks)

Column A	Column B
(i) Semi converter	(a) Boost converter
(ii) Fully controlled converter	(b) Two SCRs and two diodes
(iii) Step-down chopper	(c) Four SCRs
(iv) Step-up chopper	(d) Buck converter
(v) AC chopper	(e) Variable AC output

7. Flowchart-Based Question (5 Marks)

Complete the following flowchart:



- a) Fill in the missing block. (1 Mark)
- b) Write the function of the converter. (2 Marks)
- c) Mention one application of chopper drives. (2 Marks)

UNIT III – INVERTERS AND POWER SUPPLIES

1. Explain the operation of a single-phase full bridge inverter.
2. Write a note on McMurray inverter circuit.
3. Discuss the various methods of obtaining a sine wave output from an inverter.
4. Write a note on SMPS.

5. List any five differences between Online UPS and Offline UPS.

UNIT IV - PLC AND ROBOTICS

1. Draw the block diagram of a PLC and explain.
2. Discuss about the conveyor control using PLC.
3. Explain ladder programming using a timer.
4. Explain about the basic building blocks of robot.
5. Discuss about the types and functions of end effectors.

Analytical Descriptive Questions

6. Match the Following (5 Marks)

Column A	Column B
(i) CPU	(a) Stores the program
(ii) Memory	(b) Processes the program
(iii) Input Module	(c) Receives signals from sensors
(iv) Output Module	(d) Controls motors and lamps
(v) End Effector	(e) Holds the workpiece

7. Ladder Diagram-Based Question (5 Marks)

The following ladder logic is used to control a lamp.

Start Switch ----| |----- (Lamp)

Answer the following:

- a) Identify the input device. (1 Mark)
- b) Identify the output device. (1 Mark)
- c) State the function of the ladder diagram. (1 Mark)
- d) Mention one application of ladder programming. (2 Marks)

UNIT V - MEDICAL ELECTRONICS

1. Draw the block diagram of an EMG recorder and explain.
2. Explain resting potential and action potential.
3. Draw the block diagram of an ECG recorder and explain.
4. Write a note on peritoneal dialysis.
5. Explain the working principle of a DC defibrillator with a neat diagram.

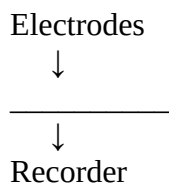
Analytical Descriptive Questions

6. Match the Following (5 Marks)

Column A	Column B
(i) ECG Recorder	(a) Muscle activity
(ii) EMG Recorder	(b) Heart activity
(iii) External Pacemaker	(c) Regulates heart rate
(iv) DC Defibrillator	(d) Restores normal heart rhythm
(v) Heart-lung Machine	(e) Used during heart surgery

7. Block Diagram-Based Question (5 Marks)

The following incomplete block diagram represents an ECG recorder.



Answer the following:

- a) Fill in the missing block. (1 Mark)
- b) State the function of the missing block. (2 Marks)
- c) Name one diagnostic equipment used to record muscle activity. (2 Marks)