



Jharkhand University of Technology, Ranchi
Diploma 4th Semester Examination, 2025 (NEP)

Subject : Fundamentals of Automation Technology
Time Allowed : 3 Hours

Subject Code : EEE 403
Full Marks : 70

Answer in your own words.

Answer any five questions.

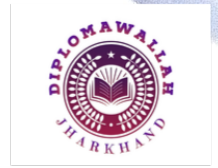
Question No. 1 is compulsory and from the rest of the questions answer any four only.
All questions carry equal marks.

2×7=14

1. Write correct answer of the following questions:

- (i) Which of the following is a sensor used for position detection?
(a) Thermistor (b) Inductive Sensor
(c) LED (d) Buzzer
- (ii) A 3/2 valve is generally used for
✓(a) Single-acting cylinders (b) Double-acting cylinders
(c) Pressure control (d) Flowmeter
- (iii) SCADA is mainly used for
(a) Speed control (b) Manual operations
✓(c) Centralized monitoring (d) Amplifications
- (iv) In PLC, which instruction is used to latch a relay?
(a) XIO (b) XIC
✓(c) OTL (d) CTU
- (v) Which of the following is a type of timer in PLC?
✓(a) TON (b) TMR
(c) CNTR (d) STP
- (vi) Which actuator converts electrical energy to rotary motion?
(a) Solenoid ✓(b) Induction motor
✓(c) Cylinder (d) Relay
- (vii) Which system is used to interface humans with automation devices?
(a) ADC (b) DAC
✓(c) HMI (d) PID

Please Turn Over



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(2)

2. (a) Define industrial automation. Discuss its objectives and advantages. (7+7)
- (b) Explain various types of sensors used in automation system. (7+7)
3. (a) Describe the construction and working of a double-acting pneumatic cylinder. (7+7)
- (b) Write a note on solenoid valves and their applications. (7+7)
4. (a) Explain the working principle of an induction motor. (7+7)
- (b) What is a VFD? Describe its used in motor speed control. (7+7)
5. (a) What are the various components of a PLC system? Explain with block diagram. (7+7)
- (b) Draw and explain a ladder logic diagram for traffic light control. (7+7)
6. (a) Define SCADA and describe its basic components. (7+7)
- (b) Differentiate between SCADA and PLC with suitable examples. (7+7)
7. Write short notes on *any four* of the following: (3.5×4=14)
- (a) LVDT sensor
 - (b) Ladder diagram for two-hand safety control
 - (c) PLC scan cycle
 - (d) Analog vs. digital sensors
 - (e) Limit switch applications

Handwritten notes: (7+7) 2/11 7/11 2/11 7/11

Jharkhand University of Technology, Ranchi
Diploma 4th Semester Examination, 2025 (NEP)

Subject : Power Electronics

Subject Code : EEE 402

Time Allowed : 3 Hours

Full Marks : 70

Answer in your own words.

Question No. 1 is compulsory and from the rest of the questions answer any four only.

All questions carry equal marks.

1. Write correct answer of the following questions:

2×7=14

- (i) A power electronics device that can conduct in both directions is
(a) SCR
(c) Diode
(b) TRIAC
(d) MOSFET
- (ii) Which semiconductor device is used in high-power applications and has a gate for control?
(a) MOSFET
(c) Diode
(b) SCR
(d) BJT
- (iii) The firing angle of a thyristor in a controlled rectifier determines
(a) load type
(c) frequency
(b) output voltage
(d) ripple factor
- (iv) A cycloconverter converts
(a) AC to DC
(c) DC to DC
(b) AC to AC with variable frequency
(d) DC to AC
- (v) Which is not a commutation method in thyristors?
(a) Natural
(c) Self
(b) Forced
(d) Manual
- (vi) In chopper circuits, duty cycle is defined as
(a) ratio of ON time to total time.
(c) ratio of load voltage to supply voltage.
(b) ratio of OFF time to ON time.
(d) ratio of frequency to voltage.
- (vii) An inverter is used to supply
(a) DC motors
(c) storage batteries
(b) AC loads
(d) Rectifiers



(2)

2. (a) Explain the construction and VI characteristics of a thyristor.
- (b) Discuss the operation of a single-phase half-controlled bridge rectifier with waveforms. 7+7
3. (a) Derive the output voltage equation for a step-up (boost) chopper.
- (b) Explain the advantages and disadvantages of MOSFET over BJT in switching applications. 7+7
4. (a) Explain the operation of a three-phase full converter with R-load.
- (b) Discuss the role of freewheeling diodes in power converter circuits. 7+7
5. (a) Draw and explain a single-phase current source inverter.
- (b) Explain sinusoidal PWM technique for inverters. 7+7
6. (a) Explain the working of an AC voltage regulator using parallel SCRs.
- (b) Compare UPS and SMPS in terms of function, design and application. 7+7
7. Write short notes on *any four* of the following: 3.5×4=14
- (a) TRIAC operation
 - (b) Boost converter
 - (c) Harmonics in inverters
 - (d) Cycloconverter applications
 - (e) Gate triggering methods of SCR



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EE/EEE

Jharkhand University of Technology, Ranchi

Diploma 4th Semester Examination, 2025 (NEP)

Subject : Computer Aided Electrical Drafting(CAED)

Subject Code : EEE-404

Time Allowed : 3 Hours

Full Marks : 70

Answer in your own words.

Answer any five questions in which Question No. 1 is compulsory.

All questions carry equal marks.

1. Write correct answer of the following questions:

2×7=14

- (i) Which of the following is an advantage of CAD over manual drafting?
- (a) Slower design speed (b) Reduced accuracy
(c) Easy modifications (d) Higher cost
- (ii) A type of wiring diagram showing actual layout is called
- (a) Schematic diagram (b) Wiring diagram
(c) Block diagram (d) Single line diagram
- (iii) In AutoCAD, the command used to create a mirror image is
- (a) COPY (b) ROTATE
(c) MIRROR (d) ARRAY
- (iv) In electrical drafting, LT stands for
- (a) Light Tube (b) Low Tension
(c) Low Transformer (d) Load Terminal
- (v) Which standard is used for representing electrical components?
- (a) IEC 60617 (b) ISO 9001
(c) IS 456 (d) IEEE 519
- (vi) Wave winding is commonly used for
- (a) low voltage, high current machines. (b) high voltage, low current machines.
(c) domestic wiring. (d) transformer coils.



(vii) The purpose of a busbar in an electrical system is

- (a) Signal amplification
- (b) Power distribution
- (c) Power factor correction
- (d) Voltage transformation

2. (a) Explain the advantages of CAD in preparing electrical drawings compared to manual drafting
(b) List and describe any five CAD commands used in electrical drafting. 7+7

3. (a) Draw the single line diagram of a small industrial power distribution system.
(b) Explain the importance of layer management in AutoCAD electrical drawings. 7+7

4. (a) Prepare a wiring layout for a laboratory with lighting, fans and sockets.
(b) Discuss the procedure for scaling and dimensioning in CAD software. 7+7

5. (a) Draw the schematic diagram of an LT panel and label its sections.
(b) Explain the function of circuit breakers and isolators in LT panels. 7+7

6. (a) Draw and explain the lap winding diagram of a DC motor.
(b) Discuss the applications and advantages of lap winding in electrical machines. 7+7

7. Write short notes on any four of the following: 3.5x4=14

- (a) Advantages of CAD in electrical drafting
- (b) Types of wiring diagrams
- (c) Core and shell type transformers
- (d) Earthing methods in electrical installations
- (e) Wave winding applications



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EE/EEE

Jharkhand University of Technology, Ranchi
Diploma 4th Semester Examination, 2025 (NEP)

Subject : Electric Motors

Subject Code : EEE 401

Time Allowed : 3 Hours

Full Marks : 70

Answer in your own words.

Answer any five questions in which Question No. 1 is compulsory.

All questions carry equal marks.

1. Write correct answer of the following questions:

2×7

- (i) The speed of a DC motor is controlled by
 (a) Field flux (b) Armature voltage
 (c) Load (d) Supply frequency
- (ii) Which part of an induction motor carries the winding?
 (a) Rotor (b) Shaft
 (c) Stator (d) Commutator
- (iii) Which test is used to determine the efficiency of a 3-phase induction motor?
 (a) Open circuit test (b) Blocked rotor test
 (c) No-load test (d) Brake test
- (iv) Which motor has the highest starting torque?
 (a) DC shunt motor (b) Slip ring IM
 (c) Universal motor (d) Synchronous motor
- (v) Soft starter is used to
 (a) start motor silently. (b) control speed.
 (c) reduce starting current. (d) prevent overheating.
- (vi) Which motor is commonly used in electric vehicles?
 (a) Universal motor (b) BLDC motor
 (c) Shaded pole motor (d) Stepper motor
- (vii) Function of overload relay is to
 (a) control speed (b) measure power
 (c) detect overcurrent (d) reduce slip

2. (a) Explain different types of DC motors with applications.

(b) Derive torque equation for a DC motor.

7+7



401

(2)

3. (a) Explain construction and working of three-phase induction motor.
(b) Define slip and explain its significance. 7+7
4. (a) Explain DOL starter with neat diagram.
(b) Describe methods of speed control in induction motor. 7+7
5. (a) Explain the operation of synchronous condenser.
(b) Write short note on hunting and phase swinging. 7+7
6. (a) Explain protection classes (IP ratings) of motors.
(b) Describe installation and maintenance of synchronous motor. 7+7
7. Write short notes on *any four* of the following: 3½x4=14
- (a) Capacitor start induction motor
 - (b) Reluctance motor
 - (c) Motor analyzer tools
 - (d) MCCB and MCB
 - (e) Forward and reverse control circuit