



KAMALDNP

kamaldnp.com • IT Training, Varanasi

PDF created by Raj Kamal using AI

Model Practice Paper — Fundamentals of Electrical & Electronics Engineering

BTEUP Diploma • 1st Semester (First Year — Common Curriculum, All 41 Branches)
Session 2026-27

Practice Questions / Model Paper — NOT a BTEUP board paper

Time: 2.30 Hours

Max. Marks: 60

General Instructions:

- All questions are compulsory. Each question has three parts (a), (b) and (c) — **answer any two** of the three parts in every question.
- Each part carries 6 marks; each question carries 12 marks.
- Draw neat, labelled diagrams wherever they are asked or wherever they support your answer.
- Write your answers in your own words, in the same order as the questions.

About this paper: This is an original practice (model) paper prepared by KAMALDNP Academy from the official BTEUP 2026-27 syllabus topics for this subject. It is NOT a BTEUP board paper, and no question in it is promised to appear in your examination. Its structure follows the board's last published paper pattern (5 questions, each with three parts of which any two are to be answered), scaled to this subject's theory maximum of 60 marks (external) in the verified 2026-27 scheme; the printed time follows the same last published pattern. The 2026-27 scheme's own paper format has not been published yet — when your board paper is in your hand, its printed instructions govern.

Q1. (From: Basic Electrical Concepts) — Answer any two of the following:

- (a) Define charge, current, voltage, resistance and power. Write the unit of each quantity.

(6)

- (b) State Ohm's law. A resistor of 20 ohm is connected across a 100 V supply. Calculate the current through the resistor and the power consumed. (6)
- (c) Two resistors of 6 ohm and 12 ohm are connected (i) in series and (ii) in parallel. Calculate the equivalent resistance in each case. (6)

Q2. (From: AC & DC) — Answer any two of the following:

- (a) Differentiate between direct current (DC) and alternating current (AC). Draw the waveform of each. (6)
- (b) Explain briefly single-phase AC. Define cycle, amplitude, time period and frequency, and write the relation between frequency and time period. (6)
- (c) Describe briefly a transformer, its main parts and its working principle. A transformer has 200 turns in the primary and 50 turns in the secondary. If the primary voltage is 400 V, calculate the secondary voltage and state whether it is a step-up or a step-down transformer. (6)

Q3. (From: Electronic Components) — Answer any two of the following:

- (a) Describe briefly resistors, capacitors and inductors. Write the symbol and unit of each and give one use of each. (6)
- (b) Write a short note on a diode. Draw its symbol, name its terminals and state where it is used. (6)
- (c) Write a short note on a transistor. Name its three terminals and explain briefly its use as an amplifier and as a switch. (6)

Q4. (From: Measuring Instruments) — Answer any two of the following:

- (a) Describe briefly a multimeter. State what quantities it can measure and name its main parts. (6)
- (b) Differentiate between an ammeter and a voltmeter, including how each is connected in a circuit. (6)
- (c) Explain with a neat circuit diagram how the current through a resistor and the voltage across it are measured. State one precaution to be taken while measuring. (6)

Q5. (From: Basic Electrical Concepts + Measuring Instruments (mixed)) — Answer any two of the following:

- (a) An electric iron draws a current of 4 A when connected to a 220 V supply. Calculate the resistance of the iron and the power consumed by it. (6)
- (b) Two resistors of 30 ohm each are connected in parallel across a 60 V source. Calculate the equivalent resistance and the total current drawn from the source. (6)
- (c) Describe briefly the steps to measure the resistance of an unknown resistor using a multimeter. State the precautions to be taken. (6)

Model Answer Outline — Fundamentals of Electrical & Electronics Engineering

The key points a full-marks answer contains, question by question.

Practice Questions / Model Paper — NOT a BTEUP board paper

Q1(a)

- Charge: the basic electrical quantity carried by electrons; symbol Q; unit coulomb (C)
- Current: rate of flow of charge through a conductor; symbol I; unit ampere (A); $1 \text{ A} = 1 \text{ C per second}$
- Voltage: electrical pressure / potential difference that pushes current through a circuit; symbol V; unit volt (V)
- Resistance: opposition offered to the flow of current; symbol R; unit ohm (Ω); depends on material, length and thickness of the conductor
- Power: rate at which electrical energy is used; symbol P; unit watt (W); $P = V \times I$

Q1(b)

- Ohm's law: at constant temperature, current through a conductor is directly proportional to the voltage across it; $V = I \times R$
- Given: $R = 20 \Omega$, $V = 100 \text{ V}$ — Formula: $I = V / R$
- Substitution: $I = 100 / 20 = 5 \text{ A}$
- Formula for power: $P = V \times I$ — Substitution: $P = 100 \times 5 = 500 \text{ W}$
- Final answers: Current = 5 A, Power = 500 W

Q1(c)

- Series connection: components joined end to end, same current flows through each; equivalent resistance $R = R_1 + R_2$
- Substitution (series): $R = 6 + 12 = 18 \Omega$
- Parallel connection: components joined between the same two points, same voltage across each; $1/R = 1/R_1 + 1/R_2$
- Substitution (parallel): $1/R = 1/6 + 1/12 = 3/12$, so $R = 12 / 3 = 4 \Omega$
- Final answers: Series equivalent = 18Ω , Parallel equivalent = 4Ω — parallel equivalent is always less than the smallest resistor

Q2(a)

- DC (direct current): flows in one direction only, with a fixed positive and negative terminal; obtained from a cell or battery
- AC (alternating current): changes direction again and again in a fixed time; obtained from the mains supply / an alternator

- Waveform difference: DC is a straight line at a constant level; AC follows a wave rising and falling on both sides of zero — draw both diagrams
- Voltage behaviour: DC voltage stays constant; AC voltage keeps changing from zero to maximum and back
- Example uses: DC — torch, mobile phone circuits; AC — fan, iron and other home appliances

Q2(b)

- Single-phase AC is an alternating supply given through two wires — one phase wire and one neutral wire — as used in homes
- Cycle: one complete set of changes of the AC wave, from zero to positive maximum, back through zero to negative maximum and to zero again
- Amplitude: maximum value reached by the voltage or current in a cycle
- Time period (T): time taken for one complete cycle, in seconds; Frequency (f): number of cycles per second, in hertz (Hz)
- Relation: $f = 1 / T$ — e.g. for the 50 Hz mains supply, $T = 1 / 50 = 0.02 \text{ s}$

Q2(c)

- A transformer is a static device that changes AC voltage from one level to another — it works only on AC, not on DC
- It works on the principle of electromagnetic induction between two coils wound on a common laminated iron core
- Parts: primary coil (takes the input supply), secondary coil (gives the output), and the iron core between them
- Given: $N_p = 200$, $N_s = 50$, $V_p = 400 \text{ V}$ — Formula: $V_s / V_p = N_s / N_p$
- Substitution: $V_s = 400 \times 50 / 200 = 100 \text{ V}$ — Final answer: Secondary voltage = 100 V; since $N_s < N_p$ it is a step-down transformer

Q3(a)

- Resistor: opposes the flow of current and controls current in a circuit; symbol R; unit ohm (Ω) — draw its symbol
- Capacitor: stores electrical charge / energy for a short time and can block DC while passing AC in brief; symbol C; unit farad (F) — draw its symbol
- Inductor: a coil that stores energy in its magnetic field and opposes sudden change of current; symbol L; unit henry (H) — draw its symbol
- One use of each: resistor — limiting LED current; capacitor — smoothing / timing circuits; inductor — coils, chokes and transformers

Q3(b)

- A diode is a two-terminal electronic device made of semiconductor material; its two terminals are called anode and cathode
- Main property: it allows current to flow in one direction only and blocks it in the opposite direction

- Draw its symbol and mark anode and cathode; the arrow in the symbol shows the allowed direction of current
- Uses in brief: converting AC into DC (rectification), and in light-emitting form as an LED indicator

Q3(c)

- A transistor is a three-terminal semiconductor device; its terminals are base, collector and emitter — draw its symbol and mark the terminals
- It is a small device that can control a larger current by a small current at its base
- Use as an amplifier: a weak signal applied at the input is obtained stronger at the output
- Use as a switch: it can switch a load ON or OFF in electronic circuits
- It is the basic building block of modern electronic equipment in brief

Q4(a)

- A multimeter is a single instrument that can measure voltage, current and resistance — hence the name 'multi' meter
- It has a selector (rotary) switch to choose the quantity and the range before measuring
- It has display / scale for the reading and leads (probes) — red for positive and black for common / negative
- Types in brief: analog multimeter with a moving needle, and digital multimeter showing the value in numbers
- Uses: checking supply voltage, continuity, battery condition and component resistance in repair and laboratory work

Q4(b)

- An ammeter measures current in a circuit; a voltmeter measures voltage (potential difference) between two points
- Connection: ammeter is always connected in series in the circuit; voltmeter is always connected in parallel across the component
- Reason: all the circuit current must pass through the ammeter, while the voltmeter must receive the full voltage between the two points
- Internal resistance in brief: an ammeter has very low resistance; a voltmeter has very high resistance
- Units and symbols: ammeter reads in ampere (A), voltmeter reads in volt (V) — draw a simple circuit showing both connections

Q4(c)

- Circuit: a battery, a resistor, an ammeter in series with the resistor, and a voltmeter in parallel across the resistor — draw it neatly and label every part
- Current measurement: break the circuit at one point and join the ammeter in series so the same current flows through it; note the reading in ampere
- Voltage measurement: join the voltmeter across the two ends of the resistor without breaking the circuit; note the reading in volt

- Polarity: connect positive lead to the positive side and negative lead to the negative side in a DC circuit
- Precaution: select a range higher than the expected value first, then reduce it for a better reading

Q5(a)

- Given: $V = 220 \text{ V}$, $I = 4 \text{ A}$ — Formula (Ohm's law): $R = V / I$
- Substitution: $R = 220 / 4 = 55 \Omega$
- Formula for power: $P = V \times I$ — Substitution: $P = 220 \times 4 = 880 \text{ W}$
- Final answers: Resistance of the iron = 55Ω , Power consumed = 880 W
- Note in a line: the same result is obtained from $P = I^2 R = 4 \times 4 \times 55 = 880 \text{ W}$

Q5(b)

- Given: two resistors, $R_1 = R_2 = 30 \Omega$, in parallel — Formula: $1/R = 1/R_1 + 1/R_2$
- Substitution: $1/R = 1/30 + 1/30 = 2/30$, so equivalent resistance $R = 30 / 2 = 15 \Omega$
- Formula (Ohm's law): $I = V / R$, with $V = 60 \text{ V}$
- Substitution: $I = 60 / 15 = 4 \text{ A}$
- Final answers: Equivalent resistance = 15Ω , Total current from the source = 4 A

Q5(c)

- Switch the multimeter OFF work first: the component whose resistance is to be measured must not be connected to any supply — remove it from the live circuit
- Set the selector switch to the resistance (Ω) range; choose a range higher than the expected value if the value is unknown
- Touch / connect the two probes across the two ends of the resistor — polarity does not matter for resistance
- Read the value shown on the display in ohm; if the reading is very small or shows overload, change to a suitable range and read again
- Precautions: keep fingers off the metal tips while measuring, and never measure resistance in a live circuit