Basic Electronics Engineering Important Questions PDF

Basic Electronics Engineering usually covers semiconductor diodes and their applications, BJT and FET basics, operational amplifiers, digital electronics fundamentals, and an introduction to communication systems or sensors. Common questions are rectifier efficiency and ripple, Zener regulators, α and β of a BJT, op-amp gain circuits, number conversions and K-maps.

Key takeaways

- Diodes: PN junction, V-I curve, half-wave and full-wave rectifiers, Zener regulator, clippers and clampers.
- Transistors: BJT configurations, α-β relation, biasing basics, and JFET and MOSFET construction.
- Op-amps: ideal characteristics, inverting and non-inverting gain, summing amplifier, integrator and differentiator.
- Digital and communication: number systems, logic gates, K-maps and the basic communication block diagram.
- These are practice questions based on common syllabus topics, not verified past papers.

About these important questions

These are **practice questions** built from topics that appear in most Indian B.Tech syllabi for Basic Electronics Engineering, including AKTU and universities that follow the AICTE model curriculum. They are **not verified past papers**, and we do not claim that any question will appear in your exam. Unit numbers and topic order differ between universities, so first match each unit below with your own university syllabus. For real previous papers, use your university's official archive. AKTU students can download them from the AKTU old question paper page.

Each unit lists key definitions, derivations or theory questions, numericals with short answer outlines, and long-answer questions. Use the outlines to check your method, then write full solutions yourself.

Unit 1: Semiconductor Diodes and Applications

Key definitions: intrinsic and extrinsic semiconductors, PN junction, depletion region, forward and reverse bias, barrier potential, Zener and avalanche breakdown, ripple factor, rectification efficiency, PIV.

Derivations:

- Derive the efficiency and ripple factor of a half-wave rectifier. Results: efficiency 40.6%, ripple factor 1.21.
- Derive the same for a full-wave rectifier. Results: efficiency 81.2%, ripple factor 0.48.

Numericals (answer outline):

- A Zener regulator has a given input voltage, series resistor, Zener voltage and load. Find the Zener current. Outline: IS = (Vin - Vz)/R, IL = Vz/RL, Iz = IS - IL.
- Find the DC output voltage and PIV of a bridge rectifier for a given transformer secondary voltage. Vdc = 2Vm/π, PIV = Vm.

Long-answer questions: Explain the V-I characteristics of a PN junction diode. Explain the working of a bridge rectifier with a capacitor filter, with waveforms. Explain series and shunt clippers and a positive clamper.

Unit 2: BJT and FET

Key definitions: NPN and PNP transistors, CB, CE and CC configurations, current gains α and β, active, cut-off and saturation regions, biasing, Q-point, JFET, MOSFET (depletion and enhancement), pinch-off voltage.

Numericals (answer outline):

- If α = 0.98, find β. Answer: β = α/(1 - α) = 49.
- In a CE circuit, IB = 20 μA and β = 100. Find IC and IE. Answer: IC = 2 mA, IE = 2.02 mA.
- Find the Q-point of a fixed-bias circuit for given VCC, RB, RC and β. Outline: IB = (VCC - VBE)/RB, IC = βIB, VCE = VCC - ICRC.

Long-answer questions: Draw and explain the input and output characteristics of the CE configuration. Compare CB, CE and CC configurations. Explain the construction and characteristics of an n-channel enhancement MOSFET and compare it with a BJT.

Unit 3: Operational Amplifiers

Key definitions: ideal op-amp characteristics, virtual ground, CMRR, slew rate, input offset voltage, open-loop gain.

Derivations:

- Derive the gain of an inverting amplifier: -Rf/R1.
- Derive the gain of a non-inverting amplifier: 1 + Rf/R1.
- Derive the output of a summing amplifier, an integrator and a differentiator.

Numericals (answer outline):

- With Rf = 100 kΩ and R1 = 10 kΩ, the inverting gain is -10 and the non-inverting gain is 11.
- Design a summing amplifier that gives Vo = -(2V1 + 3V2).

Long-answer questions: Explain op-amp as an integrator and differentiator with waveforms. Explain a voltage follower and why it is used as a buffer.

Unit 4: Digital Electronics Fundamentals

Key definitions: number systems, binary arithmetic, 1's and 2's complement, logic gates, universal gates, Boolean algebra, De Morgan's theorems, SOP and POS forms, K-map, half and full adder.

Numericals (answer outline):

- Convert (25) decimal to binary. Answer: 11001. Convert (2F) hex to decimal. Answer: 47.
- Subtract using 2's complement and show each step.
- Simplify $F(A, B, C) = \Sigma m(1, 3, 5, 7)$ using a K-map. Answer: F = C.
- Implement AND, OR and NOT gates using only NAND gates.

Long-answer questions: Design a full adder, write its truth table and implement it using two half adders.

Unit 5: Communication Systems and Sensors

Key definitions: elements of a communication system, need for modulation, AM, FM, modulation index, bandwidth, transducer, sensor, active and passive transducers.

Important questions:

- Draw the block diagram of a basic communication system and explain each block.
- Why is modulation needed? Explain AM and FM with waveforms and compare them.
- Find the total power of an AM wave: $Pt = Pc(1 + \mu^2/2)$. For Pc = 10 W and $\mu = 1$, Pt = 15 W.
- Explain the working of a strain gauge, LVDT or thermistor (as listed in your syllabus).
- Short notes on IoT sensors and the electromagnetic spectrum, if your syllabus includes them.

How to score well in Basic Electronics Engineering

- Draw circuit diagrams and waveforms for every rectifier, clipper, clamper and op-amp answer.
- Learn the standard results by heart: rectifier efficiency and ripple, α-β relation, op-amp gain formulas.
- For digital questions, show every conversion step and draw the K-map with groups circled.
- Label axes and regions on all characteristic curves.

Short-answer (2-mark) questions for Basic Electronics Engineering

Short questions test definitions and one-line results. Practise answering each in two to four lines:

1. Differentiate between intrinsic and extrinsic semiconductors.
2. What is the barrier potential of silicon and germanium? (Answer: about 0.7 V and 0.3 V.)
3. Differentiate between Zener and avalanche breakdown.
4. What is the PIV of a centre-tapped full-wave rectifier? (Answer: 2Vm.)
5. Why is the CE configuration the most widely used?
6. What is the Q-point of a transistor?
7. Why is a MOSFET's input impedance very high?
8. List four characteristics of an ideal op-amp.

9. What is virtual ground?
10. Why are NAND and NOR called universal gates?
11. State De Morgan's theorems.
12. Define modulation index of an AM wave.

A 7-day revision plan for Basic Electronics Engineering

Use this plan in the last week before the exam. Adjust it to the units and weightage in your own syllabus.

- **Day 1 (Unit 1, Semiconductor Diodes and Applications):** revise the definitions, then solve the numericals and one long answer from this unit without notes.
- **Day 2 (Unit 2, BJT and FET):** revise the definitions, then solve the numericals and one long answer from this unit without notes.
- **Day 3 (Unit 3, Operational Amplifiers):** revise the definitions, then solve the numericals and one long answer from this unit without notes.
- **Day 4 (Unit 4, Digital Electronics Fundamentals):** revise the definitions, then solve the numericals and one long answer from this unit without notes.
- **Day 5 (Unit 5, Communication Systems and Sensors):** revise the definitions, then solve the numericals and one long answer from this unit without notes.
- **Day 6:** attempt one full three-hour practice paper made from these questions, or an official previous paper from your university archive.
- **Day 7:** go through your formula sheet, the short-answer list and every question you got wrong in the practice paper.

Frequently asked questions

What are the most common numericals in Basic Electronics?

Rectifier output and ripple, Zener regulator currents, α-β conversion, Q-point of a biasing circuit, op-amp gain and number system conversions are the most common.

Do I need to draw waveforms for rectifier questions?

Yes. Input and output waveforms are part of a complete answer for rectifiers, clippers, clampers, integrators and differentiators, and they help the examiner check your understanding.

How is Basic Electronics different from Electronic Devices?

Basic Electronics is a first-year introduction to diodes, transistors, op-amps and digital basics. Electronic Devices is a second-year ECE subject that goes deeper into semiconductor physics, carrier transport, PN junction theory and MOSFET models.

Are these questions from real past papers?

No. These are practice questions based on topics that are common in B.Tech syllabi. They are not verified past papers, and no question is promised to appear in your exam. Check your own university syllabus and official previous papers; AKTU students can use the AKTU old question paper archive.

Is this PDF free?

Yes. Fill in the short form on this page and the PDF downloads right away.

Sources and further reading

- AKTU: Old question papers (official archive)
- AKTU: Syllabus
- NPTEL: Free online engineering courses
- AICTE: All India Council for Technical Education

About this PDF

Prepared by the Uncodemy academic team from common B.Tech syllabus topics. These are practice questions, not past papers. Corrections: info@uncodemy.com.

More free resources and courses: uncodemy.com | info@uncodemy.com | +91 98183 66550