

PHYSICS · JEE MAIN

# Semiconductors & Electronic Devices

Chapter-wise previous year questions, with answer key

**43**

PYQS

**2020–2025**

PAPERS

**6**

TOPICS

p-n Junction Diode

Transistors

Intrinsic and Extrinsic Semiconductors

Rectifiers

Zener Diode

Energy Bands

- 1 Attempt each question on paper first — they're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap “Step-by-step solution” under it for the full working.

## Stuck on a question?

Every question has a free step-by-step solution on PrepWiser — tap “Step-by-step solution” under it.

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## p-n Junction Diode · 15 PYQs

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**Q1** JEE Main 2025 · 24 Jan · Shift 1

Consider the following statements :

- A. The junction area of solar cell is made very narrow compared to a photo diode.
- B. Solar cells are not connected with any external bias.
- C. LED is made of lightly doped p-n junction.
- D. Increase of forward current results in continuous increase of LED light intensity.
- E. LEDs have to be connected in forward bias for emission of light.

Choose the correct answer from the options given below :

- (A) A, C, E Only
- (B) B, E Only
- (C) A, C Only
- (D) B, D, E Only

[Step-by-step solution ► prepwiser.in/questions/U9uMGYG-wj](https://www.prepwiser.in/questions/U9uMGYG-wj)

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**Q2** JEE Main 2024 · 9 Apr · Shift 1

A light emitting diode (LED) is fabricated using GaAs semiconducting material whose band gap is 1.42eV. The wavelength of light emitted from the LED is :

- (A) 1243 nm
- (B) 875 nm
- (C) 650 nm
- (D) 1400 nm

[Step-by-step solution ► prepwiser.in/questions/ZcCBB2MrVk](https://www.prepwiser.in/questions/ZcCBB2MrVk)

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**Q3** JEE Main 2024 · 1 Feb · Shift 2

Conductivity of a photodiode starts changing only if the wavelength of incident light is less than 660nm. The band gap of photodiode is found to be  $\left(\frac{X}{8}\right)$  eV. The value of X is :

(Given,  $h = 6.6 \times 10^{-34}$  Js,  $e = 1.6 \times 10^{-19}$  C)

- (A) 11
- (B) 13
- (C) 15
- (D) 21

[Step-by-step solution ► prepwiser.in/questions/SMJ\\_JELyJK](https://www.prepwiser.in/questions/SMJ_JELyJK)

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**Q4** JEE Main 2023 · 6 Apr · Shift 2

Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R  
Assertion A: Diffusion current in a p-n junction is greater than the drift current in magnitude if the junction is forward biased.

Reason R: Diffusion current in a p-n junction is from the n-side to the p-side if the junction is forward biased.

In the light of the above statements, choose the most appropriate answer from the options given below

- (A) Both A and R are correct but R is NOT the correct explanation of A
- (B) A is correct but R is not correct
- (C) A is not correct but R is correct
- (D) Both A and R are correct and R is the correct explanation of A

[Step-by-step solution ► prepwiser.in/questions/hIYnzj\\_ywI](https://www.prepwiser.in/questions/hIYnzj_ywI)

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**Q5** JEE Main 2023 · 29 Jan · Shift 1

Which one of the following statement is **not** correct in the case of light emitting diodes?

- A. It is a heavily doped p-n junction.
- B. It emits light only when it is forward biased.
- C. It emits light only when it is reverse biased.
- D. The energy of the light emitted is equal to or slightly less than the energy gap of the semiconductor used.

Choose the correct answer from the options given below:

- (A) A
- (B) B
- (C) C and D
- (D) C

[Step-by-step solution ► prepwisser.in/questions/OUqWJvfIPn](https://www.prepwisser.in/questions/OUqWJvfIPn)

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**Q6** JEE Main 2023 · 25 Jan · Shift 2

Statement I : When a Si sample is doped with Boron, it becomes P type and when doped by Arsenic it becomes N-type semi conductor such that P-type has excess holes and N-type has excess electrons.

Statement II : When such P-type and N-type semi-conductors, are fused to make a junction, a current will automatically flow which can be detected with an externally connected ameter.

In the light of above statements, choose the most appropriate answer from the options given below

- (A) Statement I is incorrect but statement II is correct
- (B) Both Statement I and statement II are correct
- (C) Statement I is correct but statement II is incorrect
- (D) Both Statement I and Statement II are incorrect

[Step-by-step solution ► prepwisser.in/questions/MT9KSd9yhV](https://www.prepwisser.in/questions/MT9KSd9yhV)

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**Q7** JEE Main 2023 · 25 Jan · Shift 1

Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R

Assertion A : Photodiodes are used in forward bias usually for measuring the light intensity.

Reason R : For a p-n junction diode, at applied voltage  $V$  the current in the forward bias is more than the current in the reverse bias for  $|V_z| > \pm v \geq |v_0|$  where  $v_0$  is the threshold voltage and  $V_z$  is the breakdown voltage.

In the light of the above statements, choose the correct answer from the options given below

- (A) Both A and R are true but R is NOT the correct explanation of A
- (B) A is true but R is false
- (C) Both A and R are true and R is the correct explanation of A
- (D) A is false but R is true

[Step-by-step solution ► prepwisser.in/questions/VqengEQyyp](https://www.prepwisser.in/questions/VqengEQyyp)

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**Q8** JEE Main 2023 · 24 Jan · Shift 1

Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R  
Assertion A : Photodiodes are preferably operated in reverse bias condition for light intensity measurement.

Reason R : The current in the forward bias is more than the current in the reverse bias for a  $p - n$  junction diode.

In the light of the above statements, choose the correct answer from the options given below :

- (A) Both A and R are true and R is the correct explanation of A
- (B) A is false but R is true
- (C) A is true but R is false
- (D) Both A and R are true but R is NOT the correct explanation of A

[Step-by-step solution ► prepwiser.in/questions/0xqMtWCRg-](https://www.prepwiser.in/questions/0xqMtWCRg-)

**Q9** JEE Main 2022 · 29 Jul · Shift 1

If the potential barrier across a  $p-n$  junction is  $0.6V$ . Then the electric field intensity, in the depletion region having the width of  $6 \times 10^{-6}m$ , will be \_\_\_\_\_  $\times 10^5 N/C$ .

*Numerical answer — enter the value.*

[Step-by-step solution ► prepwiser.in/questions/PesFfFCDcb](https://www.prepwiser.in/questions/PesFfFCDcb)

**Q10** JEE Main 2022 · 29 Jun · Shift 2

A potential barrier of  $0.4 V$  exists across a  $p-n$  junction. An electron enters the junction from the  $n$ -side with a speed of  $6.0 \times 10^5 ms^{-1}$ . The speed with which electron enters the  $p$  side will be  $\frac{x}{3} \times 10^5 ms^{-1}$  the value of  $x$  is \_\_\_\_\_.

(Given mass of electron =  $9 \times 10^{-31} kg$ , charge on electron =  $1.6 \times 10^{-19} C$ .)

*Numerical answer — enter the value.*

[Step-by-step solution ► prepwiser.in/questions/Wo9MvO7Vbd](https://www.prepwiser.in/questions/Wo9MvO7Vbd)

**Q11** JEE Main 2022 · 28 Jun · Shift 1

For using a multimeter to identify diode from electrical components, choose the correct statement out of the following about the diode :

- (A) It is two terminal device which conducts current in both directions.
- (B) It is two terminal device which conducts current in one direction only.
- (C) It does not conduct current gives an initial deflection which decays to zero.
- (D) It is three terminal device which conducts current in one direction only between central terminal and either of the remaining two terminals

[Step-by-step solution ► prepwiser.in/questions/bUdi-dGyM](https://www.prepwiser.in/questions/bUdi-dGyM)

**Q12** JEE Main 2022 · 25 Jun · Shift 1

The photodiode is used to detect the optical signals. These diodes are preferably operated in reverse biased mode because :

- (A) fractional change in majority carriers produce higher forward bias current
- (B) fractional change in majority carriers produce higher reverse bias current
- (C) fractional change in minority carriers produce higher forward bias current
- (D) fractional change in minority carriers produce higher reverse bias current

[Step-by-step solution ► prepwisser.in/questions/6TcH7ThHZt](https://www.prepwisser.in/questions/6TcH7ThHZt)

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**Q13** JEE Main 2021 · 22 Jul · Shift 2

Consider a situation in which reserve biased current of a particular P-N junction increases when it is exposed to a light of wavelength  $\leq 621$  nm. During this process, enhancement in carrier concentration takes place due to generation of hole-electron pairs. The value of band gap is nearly.

- (A) 1 eV
- (B) 4 eV
- (C) 0.5 eV
- (D) 2 eV

[Step-by-step solution ► prepwisser.in/questions/1dboaagMEE](https://www.prepwisser.in/questions/1dboaagMEE)

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**Q14** JEE Main 2021 · 26 Feb · Shift 1

LED is constructed from Ga-As-P semiconducting material. The energy gap of this LED is 1.9 eV. Calculate the wavelength of light emitted and its colour.

$[h = 6.63 \times 10^{-34} \text{ Js and } c = 3 \times 10^8 \text{ ms}^{-1}]$

- (A) 654 nm and orange colour
- (B) 654 nm and red colour
- (C) 1046 nm and red colour
- (D) 1046 nm and blue colour

[Step-by-step solution ► prepwisser.in/questions/ncxqHY2bIi](https://www.prepwisser.in/questions/ncxqHY2bIi)

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**Q15** JEE Main 2020 · 5 Sep · Shift 1

With increasing biasing voltage of a photodiode, the photocurrent magnitude :

- (A) Increases initially and after attaining certain value, it decreases
- (B) Increases linearly
- (C) Increases initially and saturates finally
- (D) Remains constant

[Step-by-step solution ► prepwisser.in/questions/laEc\\_CSSwx](https://www.prepwisser.in/questions/laEc_CSSwx)

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## Transistors · 15 PYQs

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**Q16** JEE Main 2023 · 12 Apr · Shift 1

In an n-p-n common emitter (CE) transistor the collector current changes from 5 mA to 16mA for the change in base current from  $100\mu\text{A}$  and  $200\mu\text{A}$ , respectively. The current gain of transistor is \_\_\_\_\_.

- (A) 210
- (B) 0.9
- (C) 9
- (D) 110

[Step-by-step solution ► prepwisser.in/questions/IiMIM6UYUd](https://www.prepwisser.in/questions/IiMIM6UYUd)

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**Q17** JEE Main 2023 · 31 Jan · Shift 2

Given below are two statements :

**Statement I:** In a typical transistor, all three regions emitter, base and collector have same doping level.

**Statement II:** In a transistor, collector is the thickest and base is the thinnest segment.

In the light of the above statements, choose the most appropriate answer from the options given below.

(A) **Statement I** is correct but **Statement II** is incorrect

(B) Both **Statement I** and **Statement II** are incorrect

(C) **Statement I** is incorrect but **Statement II** is correct

(D) Both **Statement I** and **Statement II** are correct

[Step-by-step solution ► prepwiser.in/questions/Ho1PK2KbqI](https://www.prepwiser.in/questions/Ho1PK2KbqI)

**Q18** JEE Main 2022 · 27 Jul · Shift 2

For a constant collector-emitter voltage of 8V, the collector current of a transistor reached to the value of 6mA from 4mA, whereas base current changed from  $20\mu\text{A}$  to  $25\mu\text{A}$  value. If transistor is in active state, small signal current gain (current amplification factor) will be :

(A) 240

(B) 400

(C) 0.0025

(D) 200

[Step-by-step solution ► prepwiser.in/questions/X6KjBC8ikS](https://www.prepwiser.in/questions/X6KjBC8ikS)

**Q19** JEE Main 2022 · 29 Jun · Shift 1

A transistor is used in an amplifier circuit in common emitter mode. If the base current changes by  $100\mu\text{A}$ , it brings a change of 10 mA in collector current. If the load resistance is  $2\text{ k}\Omega$  and input resistance is  $1\text{ k}\Omega$ , the value of power gain is  $x \times 10^4$ . The value of x is \_\_\_\_\_.

*Numerical answer — enter the value.*

[Step-by-step solution ► prepwiser.in/questions/JfrIRJRztR](https://www.prepwiser.in/questions/JfrIRJRztR)

**Q20** JEE Main 2022 · 28 Jun · Shift 1

Given below are two statements : One is labelled as Assertion A and the other is labelled as Reason R.

Assertion A : n-p-n transistor permits more current than a p-n-p transistor.

Reason R : Electrons have greater mobility as a charge carrier.

Choose the correct answer from the options given below :

(A) Both A and R are true, and R is 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.

[Step-by-step solution ► prepwiser.in/questions/fgEY5qYRjK](https://www.prepwiser.in/questions/fgEY5qYRjK)

**Q21** JEE Main 2022 · 27 Jun · Shift 2

For a transistor to act as a switch, it must be operated in

(A) Active region.

(B) Saturation state only.

(C) Cut-off state only.

(D) Saturation and cut-off state.

[Step-by-step solution ► prepwiser.in/questions/smMoMVyTIY](https://www.prepwiser.in/questions/smMoMVyTIY)

**Q22** JEE Main 2022 · 26 Jun · Shift 2

The positive feedback is required by an amplifier to act an oscillator. The feedback here means :

- (A) External input is necessary to sustain ac signal in output.
- (B) A portion of the output power is returned back to the input.
- (C) Feedback can be achieved by LR network.
- (D) The base-collector junction must be forward biased.

**Step-by-step solution** ► [prepwiser.in/questions/LPWnooreTO](https://www.prepwiser.in/questions/LPWnooreTO)

**Q23** JEE Main 2022 · 24 Jun · Shift 1

A transistor is used in common-emitter mode in an amplifier circuit. When a signal of 10 mV is added to the base-emitter voltage, the base current changes by 10  $\mu$ A and the collector current changes by 1.5 mA. The load resistance is 5 k $\Omega$ . The voltage gain of the transistor will be \_\_\_\_\_.

*Numerical answer — enter the value.*

**Step-by-step solution** ► [prepwiser.in/questions/MPSMgT2f1L](https://www.prepwiser.in/questions/MPSMgT2f1L)

**Q24** JEE Main 2021 · 27 Aug · Shift 1

For a transistor in CE mode to be used as an amplifier, it must be operated in :

- (A) Both cut-off and Saturation
- (B) Saturation region only
- (C) Cut-off region only
- (D) The active region only

**Step-by-step solution** ► [prepwiser.in/questions/7DK-ekF1TS](https://www.prepwiser.in/questions/7DK-ekF1TS)

**Q25** JEE Main 2021 · 27 Aug · Shift 2

For a transistor  $\alpha$  and  $\beta$  are given as  $\alpha = \frac{I_C}{I_E}$  and  $\beta = \frac{I_C}{I_B}$ . Then the correct relation between  $\alpha$  and  $\beta$  will be :

- (A)  $\alpha = \frac{1-\beta}{\beta}$
- (B)  $\beta = \frac{\alpha}{1-\alpha}$
- (C)  $\alpha\beta = 1$
- (D)  $\alpha = \frac{\beta}{1-\beta}$

**Step-by-step solution** ► [prepwiser.in/questions/KX--yB\\_S53](https://www.prepwiser.in/questions/KX--yB_S53)

**Q26** JEE Main 2021 · 27 Jul · Shift 1

A transistor is connected in common emitter circuit configuration, the collector supply voltage is 10 V and the voltage drop across a resistor of 1000  $\Omega$  in the collector circuit is 0.6 V. If the current gain factor ( $\beta$ ) is 24, then the base current is \_\_\_\_\_  $\mu$ A. (Round off to the Nearest Integer)

*Numerical answer — enter the value.*

**Step-by-step solution** ► [prepwiser.in/questions/6lzyaeqTN-](https://www.prepwiser.in/questions/6lzyaeqTN-)

**Q27** JEE Main 2021 · 18 Mar · Shift 2

The correct relation between  $\alpha$  (ratio of collector current to emitter current) and  $\beta$  (ratio of collector current to base current) of a transistor is :

- (A)  $\beta = \frac{\alpha}{1+\alpha}$
- (B)  $\alpha = \frac{\beta}{1-\alpha}$
- (C)  $\alpha = \frac{\beta}{1+\beta}$
- (D)  $\beta = \frac{1}{1-\alpha}$

**Step-by-step solution** ► [prepwiser.in/questions/5r-s3um0Q2](https://www.prepwiser.in/questions/5r-s3um0Q2)

**Q28** JEE Main 2021 · 18 Mar · Shift 1

An npn transistor operates as a common emitter amplifier with a power gain of  $10^6$ . The input circuit resistance is  $100\Omega$  and the output load resistance is  $10\text{ K}\Omega$ . The common emitter current gain ' $\beta$ ' will be \_\_\_\_\_. (Round off to the Nearest Integer).

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/c2lgOjNp45](https://www.prepwisar.in/questions/c2lgOjNp45)

**Q29** JEE Main 2021 · 24 Feb · Shift 1

If an emitter current is changed by 4 mA, the collector current changes by 3.5 mA. The value of  $\beta$  will be :

- (A) 0.875 (B) 0.5  
(C) 3.5 (D) 7

[Step-by-step solution ► prepwisar.in/questions/w1Wa04HX\\_q](https://www.prepwisar.in/questions/w1Wa04HX_q)

**Q30** JEE Main 2021 · 24 Feb · Shift 2

Given below are two statements :

Statement I : PN junction diodes can be used to function as transistor, simply by connecting two diodes, back to back, which acts as the base terminal.

Statement II : In the study of transistor, the amplification factor  $\beta$  indicates ratio of the collector current to the base current.

In the light of the above statements, choose the correct answer from the options given below.

- (A) Both Statement I and Statement II are false  
(B) Statement I is false but Statement II is true  
(C) Both Statement I and Statement II are true  
(D) Statement I is true but Statement II is false

[Step-by-step solution ► prepwisar.in/questions/jOY8YhINFh](https://www.prepwisar.in/questions/jOY8YhINFh)

## Intrinsic and Extrinsic Semiconductors · 7 PYQs

**Q31** JEE Main 2025 · 4 Apr · Shift 2

Consider a n-type semiconductor in which  $n_e$  and  $n_h$  are number of electrons and holes, respectively.

- (A) Holes are minority carriers  
(B) The dopant is a pentavalent atom  
(C)  $n_e n_h \neq n_i^2$   
(where  $n_i$  is number of electrons or holes in semiconductor when it is intrinsic form)  
(D)  $n_e n_h \geq n_i^2$   
(E) The holes are not generated due to the donors

Choose the correct answer from the options given below :

- (A) (A), (B), (E) only (B) (A), (C), (E) only  
(C) (A), (B), (C) only (D) (A), (C), (D) only

[Step-by-step solution ► prepwisar.in/questions/qxd9\\_zszsG](https://www.prepwisar.in/questions/qxd9_zszsG)

**Q32** JEE Main 2025 · 29 Jan · Shift 2

The difference of temperature in a material can convert heat energy into electrical energy. To harvest the heat energy, the material should have

- (A) low thermal conductivity and high electrical conductivity
- (B) low thermal conductivity and low electrical conductivity
- (C) high thermal conductivity and high electrical conductivity
- (D) high thermal conductivity and low electrical conductivity

[Step-by-step solution ► prepwiser.in/questions/JRGtmfj9rI](https://www.prepwiser.in/questions/JRGtmfj9rI)

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**Q33** JEE Main 2024 · 6 Apr · Shift 2

The acceptor level of a p-type semiconductor is  $6\text{eV}$ . The maximum wavelength of light which can create a hole would be : Given  $hc = 1242\text{eVnm}$ .

- (A) 407 nm
- (B) 103.5 nm
- (C) 414 nm
- (D) 207 nm

[Step-by-step solution ► prepwiser.in/questions/wDDiuaU52c](https://www.prepwiser.in/questions/wDDiuaU52c)

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**Q34** JEE Main 2023 · 31 Jan · Shift 1

The effect of increase in temperature on the number of electrons in conduction band ( $n_e$ ) and resistance of a semiconductor will be as:

- (A)  $n_e$  decreases, resistance increases
- (B) Both  $n_e$  and resistance increase
- (C)  $n_e$  increases, resistance decreases
- (D) Both  $n_e$  and resistance decrease

[Step-by-step solution ► prepwiser.in/questions/BaA0-y8IPj](https://www.prepwiser.in/questions/BaA0-y8IPj)

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**Q35** JEE Main 2021 · 26 Aug · Shift 1

Statement I : By doping silicon semiconductor with pentavalent material, the electrons density increases.

Statement II : The n-type semiconductor has net negative charge.

In the light of the above statements, choose the most appropriate answer from the options given below :

- (A) Statement - I is true but Statement - II is false.
- (B) Statement - I is false but Statement - II is true.
- (C) Both Statement I and Statement II are true.
- (D) Both Statement I and Statement II are false.

[Step-by-step solution ► prepwiser.in/questions/17dJjuptGq](https://www.prepwiser.in/questions/17dJjuptGq)

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**Q36** JEE Main 2021 · 25 Jul · Shift 2

In a semiconductor, the number density of intrinsic charge carriers at  $27^\circ\text{C}$  is  $1.5 \times 10^{16}/\text{m}^3$ . If the semiconductor is doped with impurity atom, the hole density increases to  $4.5 \times 10^{22}/\text{m}^3$ . The electron density in the doped semiconductor is \_\_\_\_\_  $\times 10^9/\text{m}^3$ .

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/CQ2vxO5awM](https://www.prepwiser.in/questions/CQ2vxO5awM)

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For extrinsic semiconductors; when doping level is increased;

- (A) Fermi-level of both p-type and n-type semiconductors will go upward for  $T > T_F K$  and downward for  $T < T_F K$ , where  $T_F$  is Fermi temperature.
- (B) Fermi-level of p-type semiconductor will go upward and Fermi-level of n-type semiconductors will go downward
- (C) Fermi-level of p and n-type semiconductors will not be affected.
- (D) Fermi-level of p-type semiconductors will go downward and Fermi-level of n-type semiconductor will go upward.

[Step-by-step solution ► prepwisser.in/questions/RkLT2jqm0f](https://www.prepwisser.in/questions/RkLT2jqm0f)

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## Rectifiers · 2 PYQs

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Statement - I :

To get a steady dc output from the pulsating voltage received from a full wave rectifier we can connect a capacitor across the output parallel to the load  $R_L$ .

Statement - II :

To get a steady dc output from the pulsating voltage received from a full wave rectifier we can connect an inductor in series with  $R_L$ .

In the light of the above statements, choose the most appropriate answer from the options given below :

- (A) Statement I is true but Statement II is false
- (B) Statement I is false but Statement II is true
- (C) Both Statement I and Statement II are false
- (D) Both Statement I and Statement II are true

[Step-by-step solution ► prepwisser.in/questions/2DSHIYNNEV](https://www.prepwisser.in/questions/2DSHIYNNEV)

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Match List I with List II.

**List I**

(a) Rectifier

(b) Stabilizer

(c) Transformer

(d) Filter

**List II**

(i) Used either for stepping up or stepping down the a.c. voltage

(ii) Used to convert a.c. voltage into d.c. voltage

(iii) Used to remove any ripple in the rectified output voltage

(iv) Used for constant output voltage even when the input voltage or load current change

Choose the correct answer from the options given below :

(A) (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

(B) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)

(C) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

(D) (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)

[Step-by-step solution ► prepwisar.in/questions/kC8j1YF4\\_2](https://www.prepwisar.in/questions/kC8j1YF4_2)

## Zener Diode · 2 PYQs

Choose the correct statement about Zener diode :

(A) It works as a voltage regulator in reverse bias and behaves like simple pn junction diode in forward bias.

(B) It works as a voltage regulator in both forward and reverse bias.

(C) It works as a voltage regulator only in forward bias.

(D) It works as a voltage regulator in forward bias and behaves like simple pn junction diode in reverse bias.

[Step-by-step solution ► prepwisar.in/questions/vXJYaZDvZz](https://www.prepwisar.in/questions/vXJYaZDvZz)

Zener breakdown occurs in a p – n junction having p and n both :

(A) heavily doped and have wide depletion layer.

(B) lightly doped and have narrow depletion layer.

(C) heavily doped and have narrow depletion layer.

(D) lightly doped and have wide depletion layer.

[Step-by-step solution ► prepwisar.in/questions/5L9iqNdx8u](https://www.prepwisar.in/questions/5L9iqNdx8u)

## Energy Bands · 2 PYQs

The energy band gap of semiconducting material to produce violet (wavelength =  $4000\overset{\circ}{\text{Å}}$ ) LED is \_\_\_\_\_ eV. (Round off to the nearest integer).

*Numerical answer — enter the value.*

[Step-by-step solution ► prepwisar.in/questions/7NMqg7w88R](https://www.prepwisar.in/questions/7NMqg7w88R)

If a semiconductor photodiode can detect a photon with a maximum wavelength of 400 nm, then its band gap energy is :

Planck's constant  $h = 6.63 \times 10^{-34}$  J.s. Speed of light  $c = 3 \times 10^8$  m/s

(A) 1.5 eV

(B) 2.0 eV

(C) 3.1 eV

(D) 1.1 eV

Step-by-step solution ► [prepwiser.in/questions/Y3uf9hZMdo](https://prepwiser.in/questions/Y3uf9hZMdo)

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## Answer key — Semiconductors & Electronic Devices

Numbers match the question numbers above. For full working, open the solution link under each question.

|    |          |    |           |    |          |    |            |    |          |    |          |    |            |    |          |
|----|----------|----|-----------|----|----------|----|------------|----|----------|----|----------|----|------------|----|----------|
| 1  | <b>B</b> | 2  | <b>B</b>  | 3  | <b>C</b> | 4  | <b>B</b>   | 5  | <b>D</b> | 6  | <b>C</b> | 7  | <b>D</b>   | 8  | <b>D</b> |
| 9  | <b>1</b> | 10 | <b>14</b> | 11 | <b>B</b> | 12 | <b>D</b>   | 13 | <b>D</b> | 14 | <b>B</b> | 15 | <b>C</b>   | 16 | <b>D</b> |
| 17 | <b>C</b> | 18 | <b>B</b>  | 19 | <b>2</b> | 20 | <b>A</b>   | 21 | <b>D</b> | 22 | <b>B</b> | 23 | <b>750</b> | 24 | <b>D</b> |
| 25 | <b>B</b> | 26 | <b>25</b> | 27 | <b>C</b> | 28 | <b>100</b> | 29 | <b>D</b> | 30 | <b>B</b> | 31 | <b>A</b>   | 32 | <b>A</b> |
| 33 | <b>D</b> | 34 | <b>C</b>  | 35 | <b>A</b> | 36 | <b>5</b>   | 37 | <b>D</b> | 38 | <b>D</b> | 39 | <b>A</b>   | 40 | <b>A</b> |
| 41 | <b>C</b> | 42 | <b>3</b>  | 43 | <b>C</b> |    |            |    |          |    |          |    |            |    |          |

### Want the next chapter?

All Physics chapters, every JEE Main PYQ, free with solutions: [prepwisar.in](https://www.prepwisar.in)