



PHYSICS

BOOKS - BETTER CHOICE PUBLICATION

SEMI CONDUCTOR DEVICES

Very Short Answer Type Questions

1. What is the effect of forward biasing on the resistance of a p-n junction?



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2. What is Zener breakdown?



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3. What is Zener breakdown?



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4. Which type of biasing gives a semiconductors diode vary high resistance?



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5. Draw a circuit diagram with a p-n junction in forward bias.



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6. Draw a PN-Junction with reverse bias.



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7. What is transistor ? Give the symbols of n-p-n and p-n-p transistor.



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8. State the factors, which controls intensity of light, emitted by a LED.



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9. Draw a circuit diagram to show how a photodiode is biased.



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10. State the factors, which controls wavelength of light, emitted by a LED.



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11. What do you mean by depletion region in a p-n junction ?



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12. What is the effect of rise in temperature on the conductivity of copper and silicon ?



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Short Answer Type Questions

1. How NPN transistor works? Explain by suitable diagram.



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2. What is a solar cell ? How does it work ?

Write its one use.



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3. Write briefly, how a Zener diode acts as voltage regulator.



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4. Write briefly, how a Zener diode acts as voltage regulator.



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5. What is an oscillator ? Draw a labelled circuit diagram for an oscillator using PNP transistor. What is the function of feed back coil in it ? Write an expression for the frequency of waves produced by it. What is the use of waves produced by it ?



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6. Explain with diagram, the working of a transistor as a common-emitter amplifier.





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7. Draw a labelled circuit diagram of a full wave rectifier using junction diodes.



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8. Explain forward bias and reverse bias of the junction diode.



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9. Write two advantages and two disadvantages of transistors over vacuum tubes.



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10. Explain the terms potential barrier for a junction diode.



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11. Draw the circuit diagram of a half wave rectifier using a junction diode.



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12. Explain the terms depletion layer



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13. Write in brief about Photo-diodes.



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14. In a transistor, base is always thin and lightly doped. (True/false)



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15. Why a transistor cannot be used as a rectifier ?



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16. The resistance of a p-n junction is low, when forward biased and is high, when reverse is biased. Explain.



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17. How does the width of the depletion region of a p-n junction vary if the reverse bias applied to it decreases?



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18. Explain how the depletion layer and barrier potential are formed in pn junction diode ?



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19. Why does the thickness of depletion layer of pn-junction increases in reverse biasing ?

Draw the circuit diagram of reverse biasing.



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20. Explain with diagram, the working of a transistor as a common-emitter amplifier.



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21. What is an oscillator ? Draw a labelled circuit diagram for an oscillator using PNP transistor. What is the function of feed back coil in it ? Write an expression for the frequency of waves produced by it. What is the use of waves produced by it ?





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22. With the help of circuit diagram, explain the working of transistor as a oscillator.



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23. What is a zener diode? How is it symbolically represented? With the help of a circuit diagram, explain the use of zener diode as a voltage stabilizer



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24. How reverse current suddenly increases at the break down voltage in case of a junction diode?



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25. In a transistor, base is always thin and lightly doped. (True/false)



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26. The resistance of a p-n junction is low, when forward biased and is high, when reverse is biased. Explain.



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27. Explain the following A transistor is a temperature - sensitive device.



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28. Explain , why the input resistance of a transistor is low and output resistance is high.



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29. If the emitter and base of n-p-n transistor have same doping concentration, explain, how will the collector and base currents be affected.



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30. What is an amplifier?



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31. Draw a labelled circuit diagram of a full wave rectifier using junction diodes.



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32. What is rectifier ? Explain the working of junction diode as a full wave rectifier, with

diagram.



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33. Explain the terms depletion layer



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34. Explain the terms depletion layer



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35. Explain the terms potential barrier for a junction diode.



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36. Explain forward bias and reverse bias of the junction diode.



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37. With the help of labelled circuit diagram, explain the working of transistor as a switch.



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38. With the help of circuit diagram, explain the working of transistor as a common emitter amplifier.



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39. With the help of suitable diagrams, explain the function of p-n junction diode as full wave rectifier.





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40. With the help of circuit diagram, explain the working of transistor as a oscillator.



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41. Define Rectification. With the help a circuit diagram explain the working of p-n junction diode as a half wave rectifier.



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42. What is transistor ? Give the symbols of n-p-n and p-n-p transistor.



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43. With the help of circuit diagram, explain the working of transistor as a common emitter amplifier.



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44. Discuss the variation of current with voltage in a P-N Junction diode when it is forward biased.



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45. With the help of circuit diagram, explain the V-I characteristics of p-n junction diode in forward biasing.



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Long Answer Type Question

1. Draw the circuit diagram of a half wave rectifier using a junction diode.



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2. What is rectifier ? Explain the working of junction diode as a full wave rectifier, with diagram.



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3. What is p-n junction diode ? Explain the principle and of various components of full wave rectifier using circuit diagrams as well as input and output waveforms.



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4. What is transistor ? Give the symbols of n-p-n and p-n-p transistor.



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5. What is transistor ? How is it formed ? Show with the help of diagram action of npn transistor



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6. With the help of circuit diagram, explain the working of transistor as a common emitter amplifier.



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7. What is an amplifier ? Draw a circuit diagram for an amplifier with PNP transistor in common emitter configuration. Also define current gain, voltage gain and power gain for it.



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8. What is an oscillator ? Draw a labelled circuit diagram for an oscillator using PNP transistor. What is the function of feed back coil in it ? Write an expression for the

frequency of waves produced by it. What is the use of waves produced by it ?



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9. What is an electric oscillator ? With the help of labelled diagram, explain the use of junction transistor as an oscillator.



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10. What is an oscillator ? With the help of circuit diagram explain the principle and working of transistor as an oscillator in common emitter configuration, showing how feedback is accomplished by inductive



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11. What is junction diode ? How is depletion layer formed ? Draw its forward and reverse

bias characteristics by showing biasing of diodes ?



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Numerical Problems

1. The base current of a transistor is $105\mu A$ and collector current is $2.05mA$.

Determine the value of β , I_e and α



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2. AC current gain for transistor in common emitter amplifier is 20. If input and output resistances are $2k\Omega$ and $5K\Omega$ respectively, find: Voltage gain



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3. AC current gain for transistor in common emitter amplifier is 20. If input and output resistances are $2k\Omega$ and $5K\Omega$ respectively, find: Power gain



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4. In a silicon transistor, the base current is changed by $20\mu A$. This results in a change of 0.02 V in base to emitter voltage and a change of 2 mA in the collector current.

Find the input resistance, β_{ac} and transconductance of the transistor g_m .

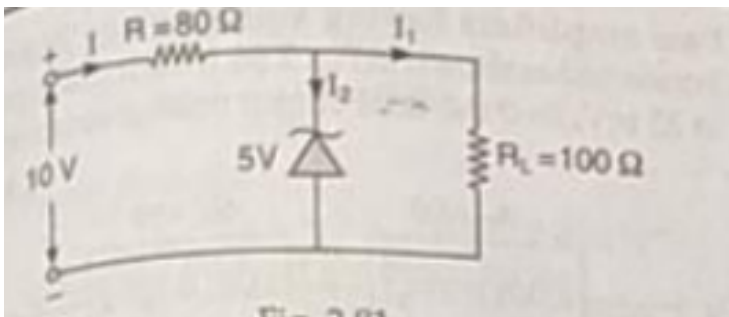


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5. A common emitter (CE) transistor has a current gain of 100. If emitter current is 8.08 mA, find the base and collector current.

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6. In the circuit shown in the figure, find the current passing through r_L and zener diode.





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7. A transistor, connected in common-emitter configuration, has input resistance $R_{\epsilon} = 3k\Omega$ and load resistance of $6k\Omega$. If $\beta = 40$ and an input signal of 20m V is applied, calculate the voltage gain, output voltage and power gain.



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8. A transistor, is connected in common-emitter configuration, has input resistance

$R_E = 1k\Omega$ and load resistance of $4k\Omega$. if $\beta = 50$ and an input signal of $10mV$ is applied, calculate the voltage gain, output voltage and power gain.



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9. A common emitter circuit has an input resistance of 570Ω and output resistance of $59k\Omega$. If the current gain is 60, find the voltage gain and power gain.



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10. A change of $20\mu A$ in the base current produces a change of 0.5mA in the collector current. Calculate β_{ac}



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11. The input resistance of a silicon transistor is 665Ω when base current is changed by $15\mu A$, the collector current changes by 2mA . In a common emitter amplifier load resistance is $5k\Omega$. Calculate current gain β_{ac}



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12. For a common emitter amplifier current gain = 50 if the emitter current is 6.6 mA. Calculate the collector and base current.



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13. A transistor, is connected in common-emitter configuration, has input resistance $R_{\epsilon} = 2k\Omega$ and load resistance of $5k\Omega$.if

$\beta = 60$ and an input signal of 12m V is applied, calculate the voltage gain, output



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14. A 100Ω resistance is connected in series with a silicon diode. If the combination is forward biased with a 12V battery, find the current through the circuit. Assume body resistance and barrier potential of diode to be 25Ω and 0.7V respectively.



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15. For a common emitter amplifier current gain is 70 if the emitter current is 8.8 milliamperes (mA). Calculate the collector and base current.



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16. For a common emitter transistor as amplifier current gain is 72. Calculate the base current for which emitter current is 8.9 milliamperes and also find collector current.



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17. A transistor connected in common emitter configuration has input resistance $R_i = 2k\Omega$ (kilo ohm) and load resistance $6k\Omega$ (kilo ohm). If current gain $\beta = 60$ and input signal 10 mV (millivolt) is applied, calculate resistance gain



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18. A transistor is used in common emitter mode in an amplifier circuit. It is found that when a signal of 20 mV (millivolt) is added to base-emitter voltage the base current changes by $20\mu A$ (micro ampere) and collector current changes by 1.5 mA (milli ampere). Determine the current gain β , Input resistance R_i , transconductance and voltage gain. Give load resistance $R_l = 6k\Omega$ (kilo ohm).



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19. A transistor is used in common emitter mode in an amplifier circuit. When a signal of 24 mV (millivolt) is added to base emitter voltage, the base current changes by $32\mu A$ (micro ampere) and collector current by 3.6 mA (milli ampere) and the load resistance is $4.8k\Omega$ (kilo ohm). Calculate the input resistance R_{be}



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20. For a common emitter amplifier, dc (direct current) current gain is 100. If the base current is $20\mu A$, calculate the collector and emitter current.



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21. For a common emitter amplifier, dc (direct current) current gain is 60. If the emitter current is $6.6mA$, calculate the collector and base current.





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22. For a common emitter amplifier, dc (direct current) current gain is 20. If the emitter current is 7mA, calculate the base and collector current.



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Most Expected Questions

1. Can two P-N junction diodes back to back works as P-N-P transistor?



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2. What type of feed back is required in an oscillator?



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3. What is Zener breakdown?



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4. What do you mean by depletion region in a p-n junction ?



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5. In a transistor, emitter is always forward biased. Why?



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6. What will happen if both emitter and collector of a transistor are reverse biased?



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