JEE MAIN : CHAPTER WISE TEST-10

SUBJECT :- PHYSICS **DATE.....**

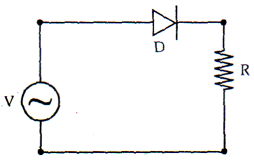
CLASS :- 12th **NAME.....**

CHAPTER :- SEMICONDUCTOR **SECTION.....**

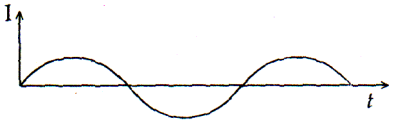
(SECTION A)

1. Zener diode is used as -
(A) Half wave rectifier
(B) Full wave rectifier
(C) ac voltage stabilizer
(D) dc voltage stabilizer

2. An *p-n* junction (D) shown in the figure can act as a rectifier. An alternating current source (V) is connected in the circuit.

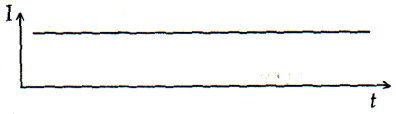


The current (I) in the resistor R can be shown by

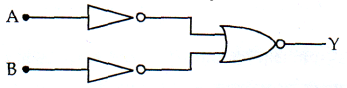
(A) 

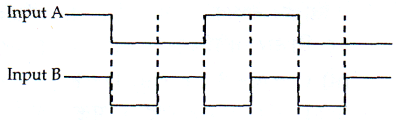
(B) 

(C) 

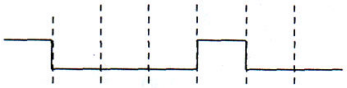
(D) 

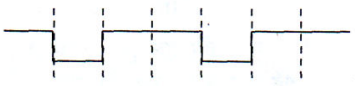
3. The logic circuit shown below has the input waveforms 'A' and 'B' as shown. Pick out the correct output waveform.



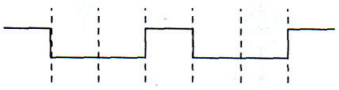


Output is :

(A) 

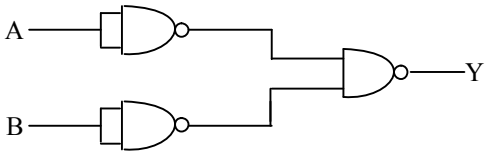
(B) 

(C) 

(D) 

4. An n – p – n transistor circuit has α = 0.985.
If I_c = 2mA, then value of I_b is -
(A) 0.03 mA (B) 0.003 mA
(C) 0.66 mA (D) 0.015 mA

5. Following circuit is equivalent to –

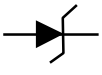


(A) AND gate (B) OR gate
(C) NOT gate (D) X-OR gate

6. If n_e and n_h are the number of electrons and holes in a semi-conductor heavily doped with phosphorus, then -
(A) $n_e >> n_h$ (B) $n \leq n_h$
(C) $n_e << n_h$ (D) none

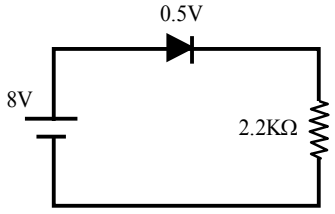
7. An n-type semi-conductor is -
(A) negatively charged
(B) positively charged
(C) neutral
(D) negatively or positively charged depending upon the amount of impurity

8. The energy gap of a semiconductor is 1.10 eV. The maximum wavelength in Å at which it starts energy absorption will be -
(A) 11.284 (B) 112.84
(C) 1128.4 (D) 11284

9. Symbolic representation of photodiode is -
(A)  (B) 
(C)  (D) 

10. The depletion layer in silicon diode is 1μm wide and the knee potential is 0.6 V, then the electric field in the depletion layer will be -
(A) Zero (B) $0.6Vm^{-1}$
(C) 6×10^4 V/m (D) 6×10^5 V/m

11. In the circuit , if the forward voltage drop for the diode is 0.5V, the current will be -



(A) 3.4 mA (B) 2 mA
(C) 2.5 mA (D) 3 mA

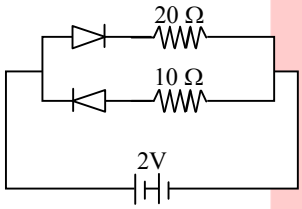
12. In common base amplifier, the ratio of power gain and resistance gain is -

(A) α (B) α^2
(C) $\frac{1}{\alpha}$ (D) $\frac{1}{\alpha^2}$

13. Given : β = 80 and ΔI_B = 250 μA. The value of ΔI_C is -

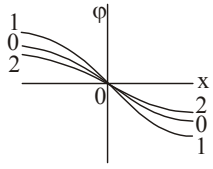
(A) 80 × 250 μA (B) (250 – 80) μA
(C) (250 + 80) μA (D) $\frac{250}{80}$ μA

14. In Fig., the current supplied by the battery is -



(A) 0.1 A (B) 0.2 A
(C) 0.3A (D) 0.4A

15. The distribution of potential near the boundary between two semiconductors with different types of conduction depends on the direction of the applied external voltage. Choose correct statement.

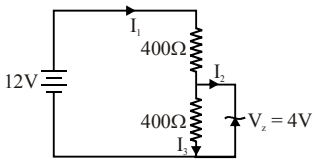


(A) The left side is p type and right side is n type and the junction is forward biased in case 2.
(B) The left side is p type and right side is n type and the junction is forward biased in case 1.
(C) The right side is p type and left side is n type and the junction is forward biased in case 2.
(D) The right side is p type and left side is n type and the junction is forward biased in case 1.

16. The relation between α and β parameters of a transistor is given by -

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

17. In the circuit shown in figure, Zener diode is properly biased. Power dissipated in diode is

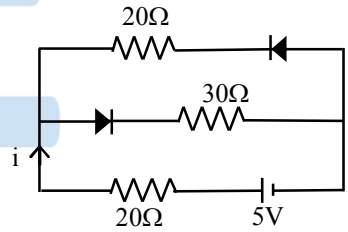


(A) 20 mW (B) 30 mW
(C) 40 mW (D) 50 mW

18. A diode as a rectifier converts -

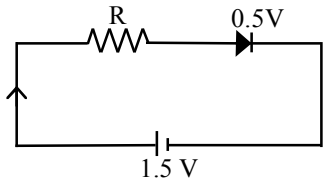
(A) A.C. into D.C.
(B) D.C. into A.C.
(C) high voltage to low voltage
(D) low voltage to high voltage

19. Current in the circuit will be –



(A) $\frac{5}{40}$ A (B) $\frac{5}{50}$ A
(C) $\frac{5}{10}$ A (D) $\frac{5}{20}$ A

20. The diode used in the circuit shown in the figure has a constant voltage drop of 0.5 V at all currents and a maximum power rating of 100 milli watts. What should be the value of the resistor R, connected in series with the diode for obtaining maximum current –



(A) 1.5 Ω (B) 5 Ω
(C) 6.67 Ω (D) 200 Ω

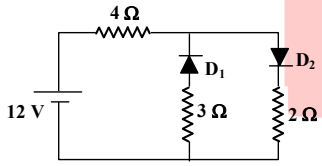
(SECTION B)

21. The collector supply voltage is 6 V and the voltage drop across a resistor of 600 Ω in the collector circuit is 0.6 V, in a transistor connected in common emitter mode. If the current gain is 20, the base current gain is 20, what is the base current in mA ?
(multiply your ans by 10)

22. A common emitter amplifier has a voltage gain of 50, an input impedance of 100 Ω and an output impedance of 200 Ω. The power gain of the amplifier is :

23. If the ratio of the concentration of electrons to that of holes in a semiconductor is $\frac{7}{5}$ and the ratio of currents is $\frac{7}{4}$, then the ratio of their drift velocities is $\frac{m}{n}$. Then what is the value of m + n?

24. The circuit has two oppositely connected ideal diodes in parallel. What is the current flowing in the circuit?

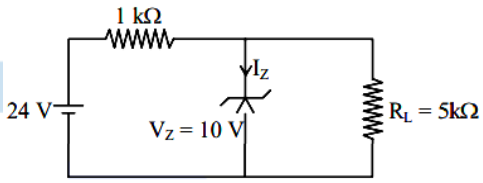


25. In a semiconductor, the number density of intrinsic charge carriers at 27°C is 1.5 × 1022/m2 . The electron density in the doped semiconductor is_____×109/m3.

26. A potential barrier of 0.4V exists across ap - n junction. An electron enters the junction from the n–side with a speed of 6.0 × 10^5 ms^{-1}. The speed with which electron enters the p side will be $\frac{x}{3}\times10^5\, ms^{-1}$ the value of x is _____.
(Given mass of electron = 9×10^{-31}C).

27. A transistor is connected in common emitter circuit configuration, the collector supply voltage is 10V and the voltage drop axross a resistor of 1000 Ω in the collector circuit is 0.6V. If the current gain factor (β) is 24. Then the base current is _____μA. (Round off to the Nearest Integer).

28. For the given circuit, the power across zener diode is ..... mW.



29. The energy band gap of semiconducting material to produce violet (wavelength = 4000Å) LED is _____eV.
(Round off to the nearest integer).

30. In the circuit shown, the current through the ideal diode is (in mA)-