Matrix Classes

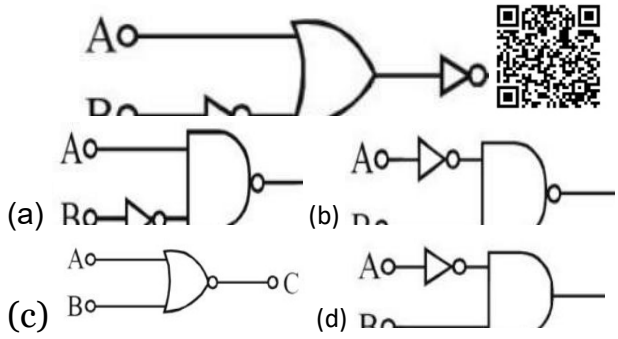
Day-1 JEE Main Physics-CCJMP01

Assignment-Logic Gates, PN Junction Diode and Zener Diode

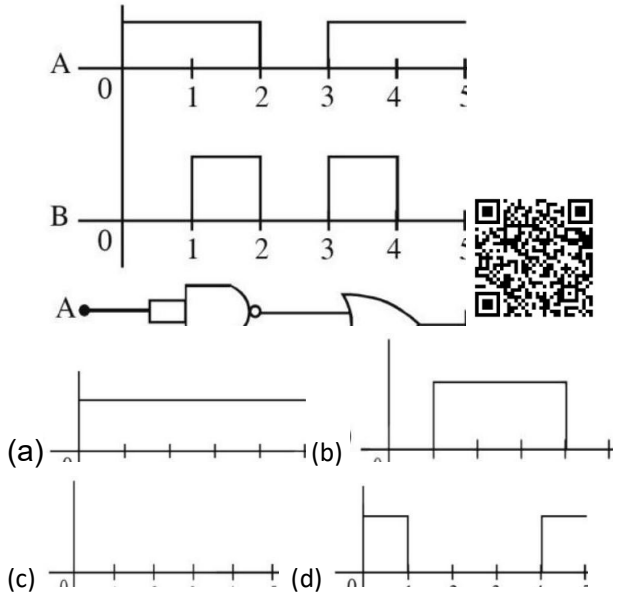
Logic Gates

Straight Objective

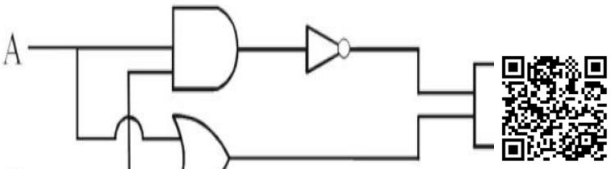
Q 1. The logic circuit shown above is equivalent to :



Q 2. Draw the output signal Y in the given combination of gates :-



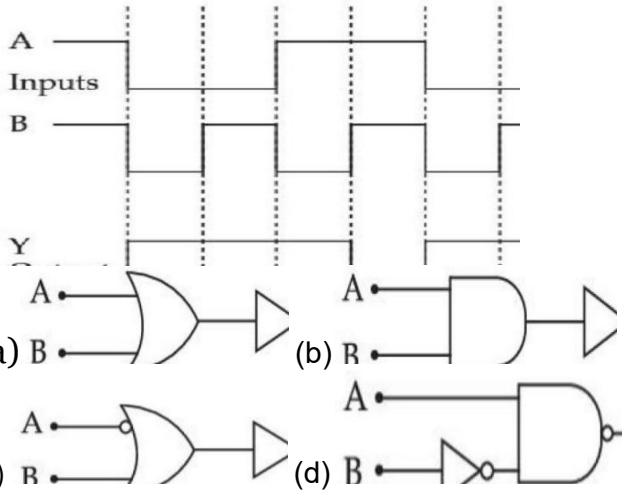
Q 3. Which one of the following will be the output of the given circuit?



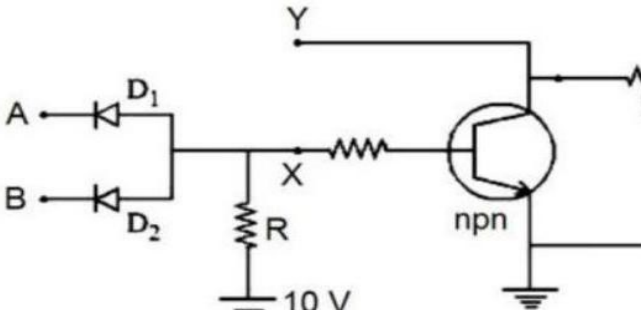
(a) NOR Gate (b) NAND Gate

(c) AND Gate (d) XOR Gate

Q 4. Identify the correct Logic Gate for the following output (Y) of two inputs A and B.



Q 5. In the following circuit, the correct relation between output (Y) and inputs A and B will be :

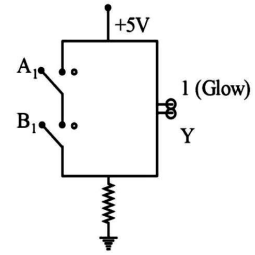


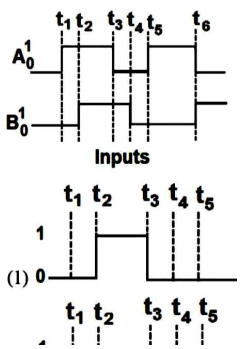
(a) $Y = AB$ (b) $Y = A + B$

(c) $Y = \overline{AB}$ (d) $Y = \overline{A + B}$

Q 6. The logic gate equivalent to the given circuit diagram is :

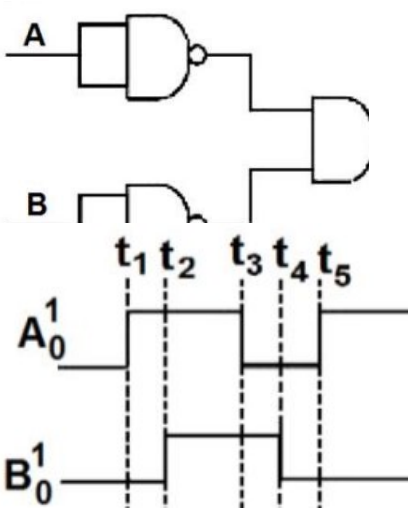
ogic gate equivalent to the given circuit
m is :

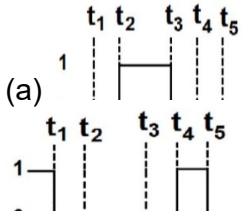


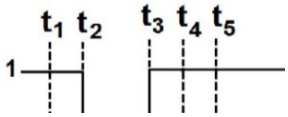


(a) OR (b) NOR (c) NAND (d) AND

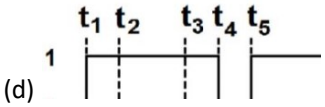
Q 7. The output waveform of the given logical circuit for the following inputs A and B as shown below, is :



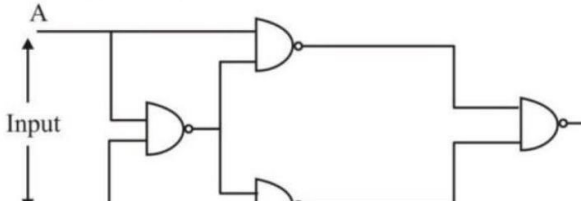
(a) 

(b) 

(c)

(d) 

Q 8. The output Y for the inputs A and B of circuit is given by



Truth table of the shown circuit is :

(a)

A	B	Y
0	0	
0	1	
1	0	

(b)

A	B	Y
0	0	
0	1	
1	0	

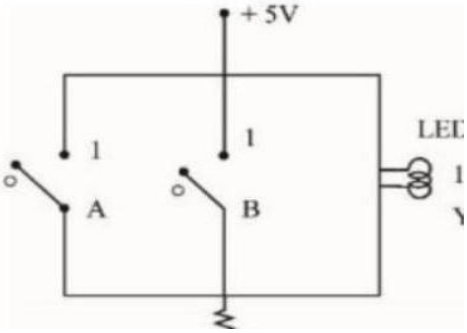
(c)

A	B	Y
0	0	
0	1	
1	0	

(d)

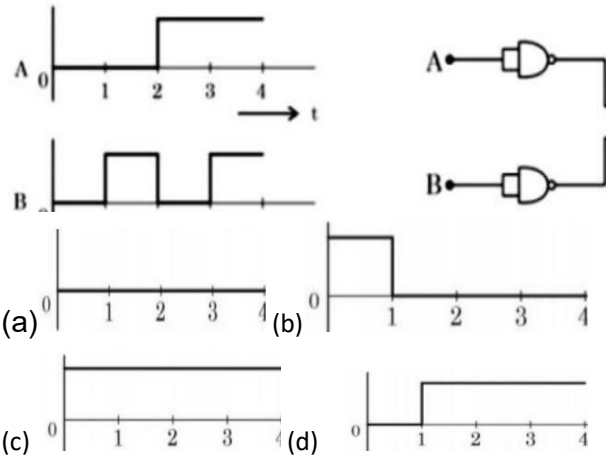
A	B	Y
0	0	
0	1	
1	0	

Q 9. Name the logic gate equivalent to the diagram attached



(a) OR (b) NOR (c) NAND (d) AND

Q 10. For the logic circuit shown, the output waveform at Y is:



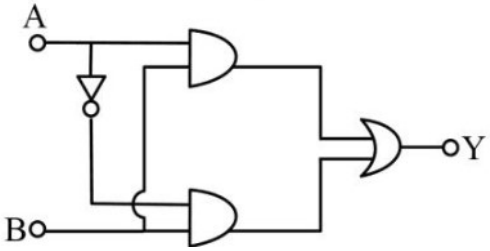
(a)

(b)

(c)

(d)

Q 11. The truth table for this given circuit is :



(a)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(b)

A	B	Y
0	0	0
0	1	1
1	0	0
1	1	1

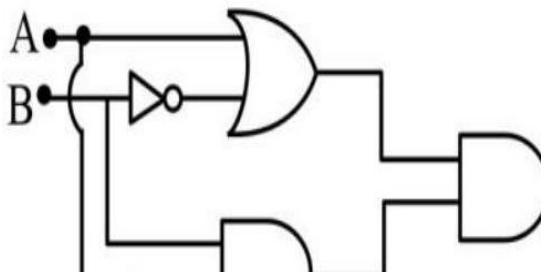
(c)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(d)

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

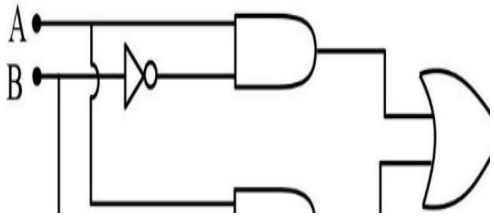
Q 12. The output Y of following circuit for given inputs is :

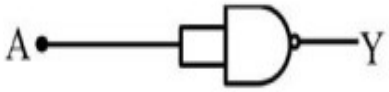


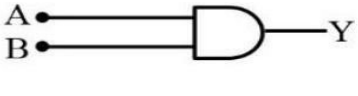
(a) $A \cdot B(A+B)$ (b) $A \cdot B$

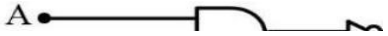
(c) 0 (d) $\overline{A} \cdot B$.

Q 13. Which of the following circuits has the same output as that of the given circuit?

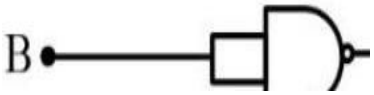


(a) 

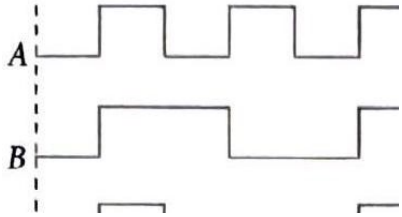
(2) 

(b) 

(c) 

(d) 

Q 14. A logic gate circuit has two inputs A and B and output Y. The voltage waveforms of A, B and Y are shown below. The logic gate circuit is



(a) AND gate (b) OR gate
(c) NOR gate (d) NAND gate

Q 15. The output of a 'NAND' gate is shown in the truth-table (A and B are inputs, Y is output)

P)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

Q)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

R)

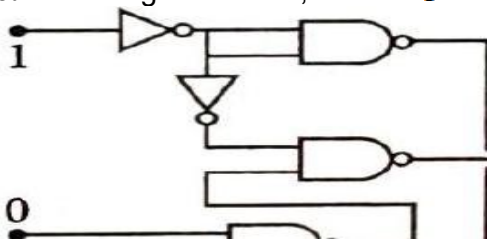
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

S)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

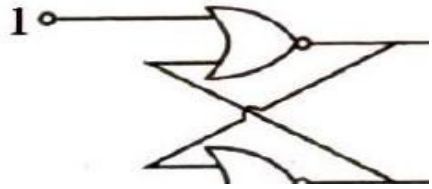
(a) P (b) R (c) Q (d) S

Q 16. In the given circuit, value of Y is



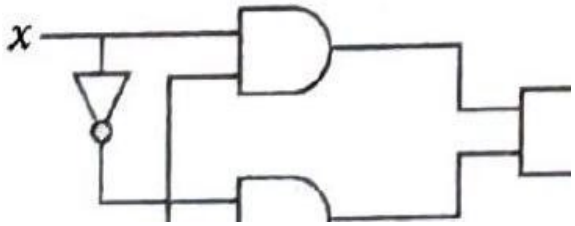
(a) toggles between 0 and 1 (b) 1
(c) 0 (d) will not execute.

Q 17. In the following circuit, what are P and Q ?



(a) $P = 0, Q = 1$ (b) $P = 0, Q = 0$
(c) $P = 1, Q = 1$ (d) $P = 1, Q = 0$

Q 18. Truth table for the following digital circuit will be



(a)

x	y	z
0	0	1
0	1	1
1	0	1
1	1	1

(b)

x	y	z
0	0	0
0	1	0
1	0	0
1	1	1

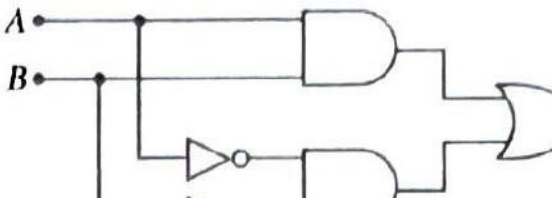
(c)

x	y	z
0	0	0
0	1	1
1	0	1
1	1	1

(d)

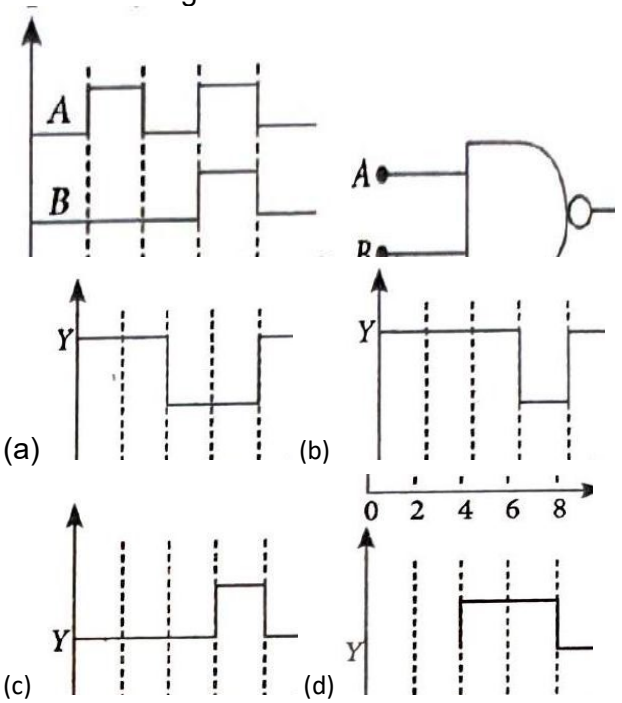
x	y	z
0	0	1
0	1	1
1	0	1
1	1	0

Q 19. In the given circuit, the binary inputs at A and B are both 1 in one case and both 0 in the next case. The respective outputs at Y in these two cases will be



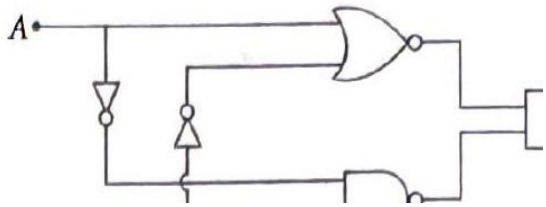
(a) 1,1 (b) 0,0 (c) 0,1 (d) 1,0

Q 20. The real time variation of input signals A and B are as shown in the figure. If the inputs are fed into NAND gate, then select the output signal from the following.

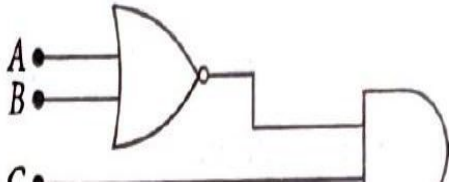


Integer type Questions

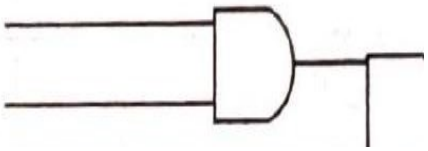
Q 21. In the logic circuit shown in the figure, if input A and B are 0 to 1 respectively, the output at Y would be ' x '. The value of x is ___ .



Q 22. A NOR gate and a NAND gate are connected as shown in the figure. Two different sets of inputs are given to this set up. In the first case, the inputs to the gates are $A=0, B=0, C=0$. In the second case, the inputs are $A=1, B=0, C=1$. The output D in the second case is ___ .

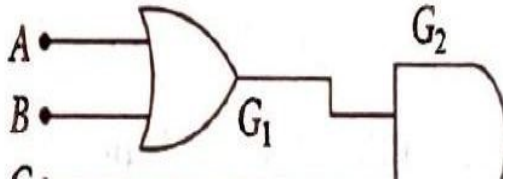


Q 23. The output Y, when all the three inputs are first high will be ___ .



Q 24. The value $(\overline{1}+\overline{1})\cdot(\overline{0}+0)$ of is ___ .

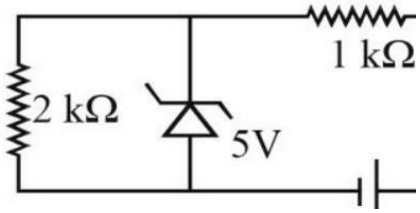
Q 25. For the given combination of gates, if the logic states of inputs A, B, C are as follows $A=B=C=0$ and $A=B=1, C=0$, then the logic states of output D are ___ .



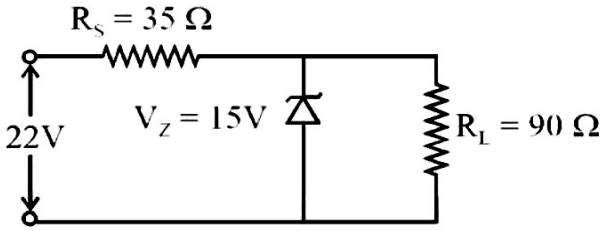
Zener Diode

Straight Objective

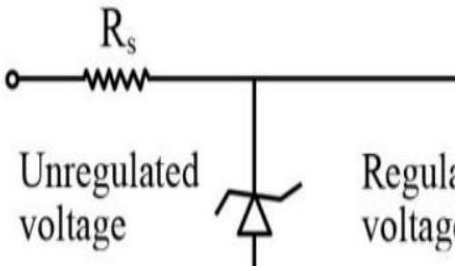
Q 26. In connection with the circuit drawn below, the value of current flowing through $2k\Omega$ resistor is $\times 10^{-4}$ A.



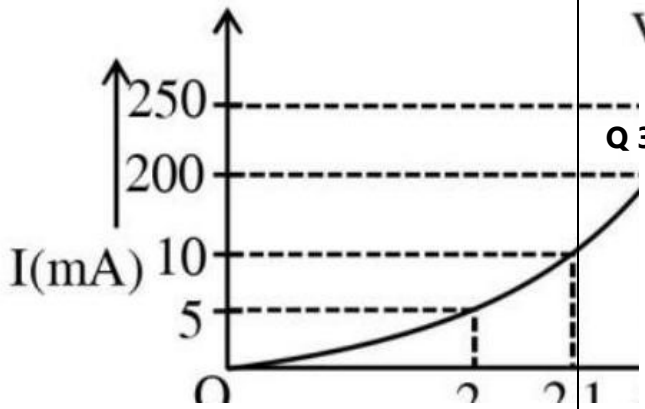
Q 27. The value of power dissipated across the Zener diode $(V_z = 15\ V)$ connected in the circuit as shown in the figure is $x \times 10^{-1}$ watt. The value of x, to the nearest integer, is



Q 28. A Zener diode of power rating $2\ W$ is to be used as a voltage regulator. If the Zener diode has a breakdown of $10\ V$ and it has to regulate voltage fluctuated between $6\ V$ and $14\ V$, the value of R_s for safe operation should be Ω.

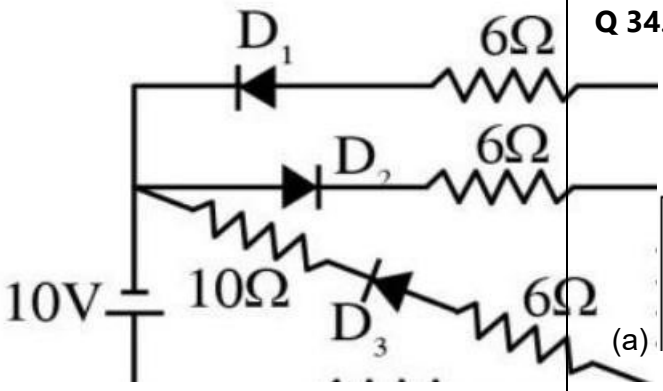


Q 29. The I-V characteristics of a p-n junction diode in forward bias is shown in the figure. The ratio of dynamic resistance, corresponding to forward bias voltages of $2\ V$ and $4\ V$ respectively, is :

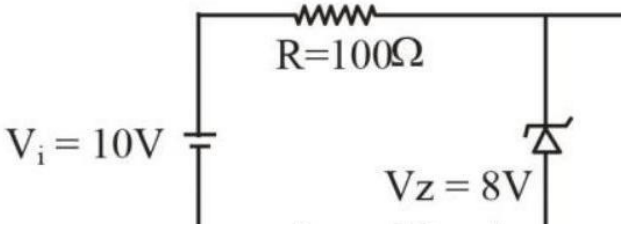


(a) $1:2$ (b) $1:40$ (c) $5:1$ (d) $20:1$

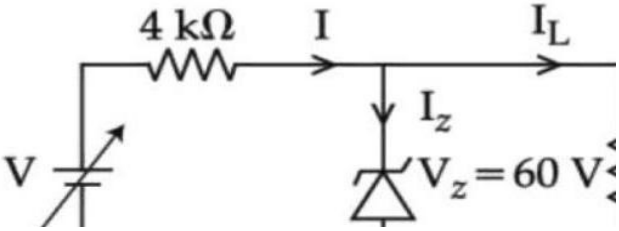
Q 30. As per the given circuit, the value of current through the battery will be A.



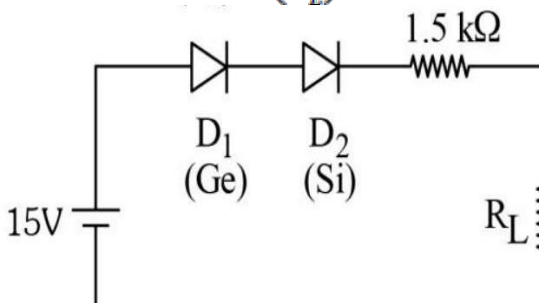
Q 31. A Zener of breakdown voltage $V_Z = 8\ V$ and maximum Zener current, $I_{ZM} = 10\ mA$ is subjected to an input voltage $V_i = 10\ V$ with series resistance $R = 100\Omega$. In the given circuit R_L represents the variable load resistance. The ratio of maximum and minimum value of R_L is



Q 32. In the circuit shown below, maximum Zener diode current will be **mA** $(V = 100 - 120\ volt)$

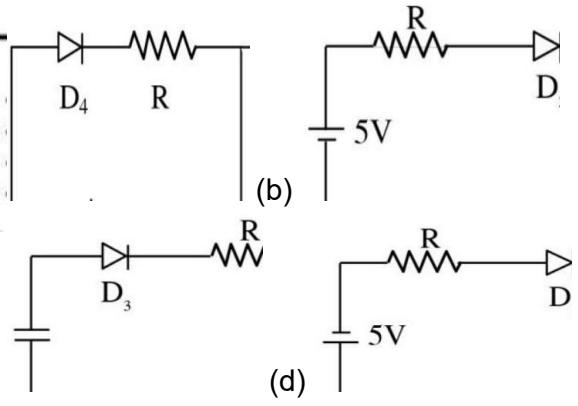


Q 33. In the given circuit, the voltage across load resistance (R_L) is:



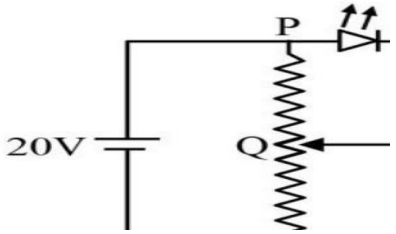
(a) 8.75 V (b) 9.00 V
(c) 8.50 V (d) 14.00 V

Q 34. Which of the diode circuit shows correct biasing used for the measurement of dynamic resistance of p-n junction diode :

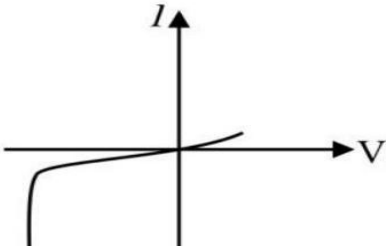


Q 35. A potential divider circuit is connected with a dc source of 20 V , a light emitting diode of glow in voltage 1.8 V and a Zener diode of breakdown voltage of 3.2 V . The length (PR) of the resistive wire is

20 cm . The minimum length of PQ to just glow the LED is cm .



Q 36. The $I-V$ characteristics of an electronic device shown in the figure. The device is :



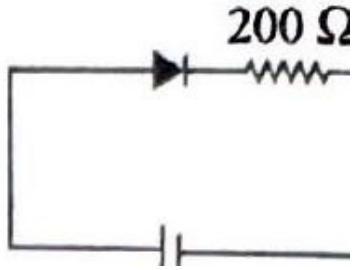
(a) a solar cell

(b) a transistor which can be used as an amplifier

(c) a Zener diode which can be used as voltage regulator

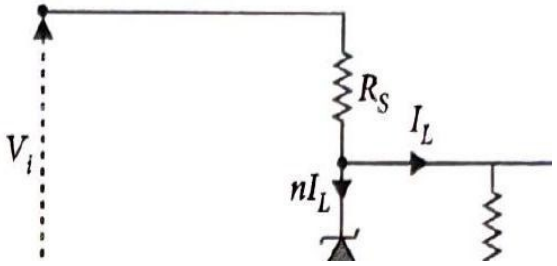
(d) a diode which can be used as a rectifier

Q 37. The reading of the ammeter for a silicon diode in the given circuit is



(a) zero (b) 15 mA (c) 11.5 mA (d) 13.5 mA

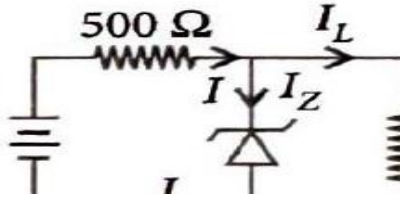
Q 38. The value of the resistor, R_S, needed in the dc voltage regulator circuit shown here, equals



(a) $(V_i - V_L)/nI_L$ (b) $(V_i + V_L)/nI_L$

(c) $(V_i - V_L)/(n+1)I_L$ (d) $(V_i + V_L)/(n+1)I_L$

Q 39. In the circuit shown below if the current through the 500Ω resistor is 25 mA and that through the load R_L is 5 mA , then the maximum current through the Zener

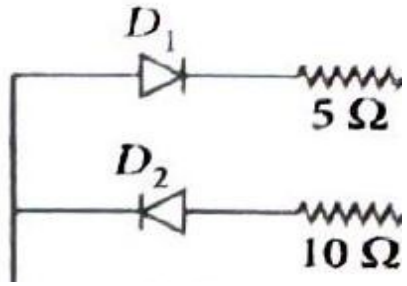


diode is

(a) 5 mA (b) 20 mA

(c) 30 mA (d) 125 mA

Q 40. A 2 V battery is connected across AB as shown in the figure. The value of the current supplied by the battery when in one case battery's positive terminal is connected to A and in other case when positive terminal of battery is connected to B will respectively be

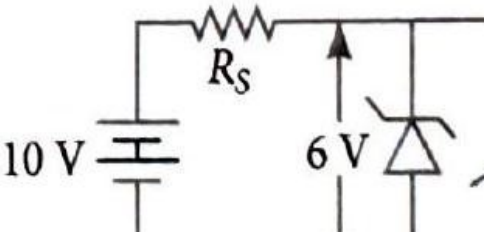


(a) 0.2 A and 0.1 A (b) 0.4 A and 0.2 A

(c) 0.1 A and 0.2 A (d) 0.2 A and 0.4 A

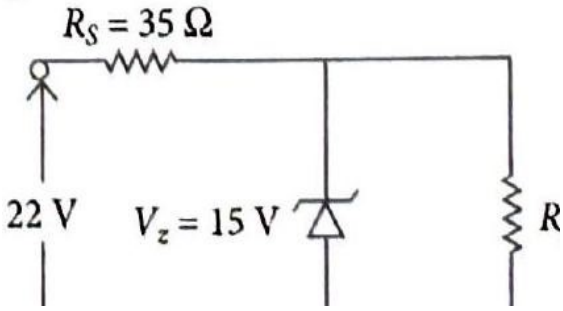
Integer type Questions

Q 41. A Zener diode having break down voltage $V_z = 6\ V$ is used in a voltage regulator circuit as shown in the figure. The minimum current required to pass through the Zener to act as a voltage regulator is 10 mA and maximum allowed current through Zener is 40 mA . The maximum value of R_s (in Ω) for Zener to act as a voltage regulator is ___ .

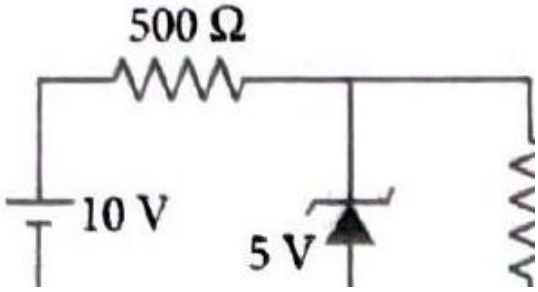


Q 42. The value of power dissipated across the Zener diode $(V_z = 15\ V)$ connected in the circuit as shown in the figure is

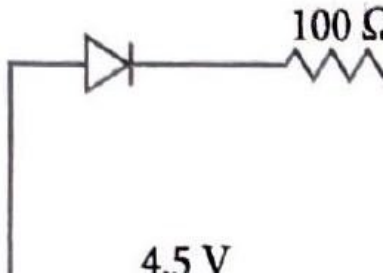
$x \times 10^{-1}$ watt. The value of x, to the nearest integer, is ___ .



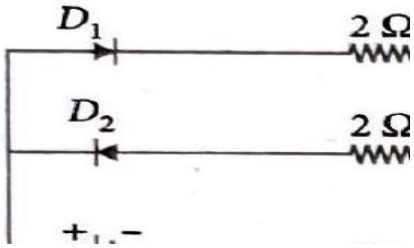
Q 43. In the following circuit, the current flowing through $1\,k\Omega$ resistor is ___ mA .



Q 44. Figure shows a diode connected to an external resistance and an emf. Assuming that the barrier potential developed in the diode is 0.5 V , then the value of current (in mA) in the circuit is___ .



Q 45. Assuming that the two diodes D_1 and D_2 used in the electric circuit shown in the figure are ideal, the value of the current (in A) flowing through 1Ω resistor is ___ .



ANSWER

Logic Gates							
Straight Objective							
Q 1.	d	**Q 2.**	d	**Q 3.**	d	**Q 4.**	b
Q 5.	c	**Q 6.**	b	**Q 7.**	d	**Q 8.**	d
Q 9.	b	**Q 10.**	d	**Q 11.**	b	**Q 12.**	c
Q 13.	a	**Q 14.**	a	**Q 15.**	d	**Q 16.**	c
Q 17.	a	**Q 18.**	a	**Q 19.**	b	**Q 20.**	b
Integer type							
Q 21.		**Q 22.**		**Q 23.**		**Q 24.**	
Q 25.							
Zener Diode							
Straight Objective							
Q 26.		**Q 27.**		**Q 28.**		**Q 29.**	c
Q 30.		**Q 31.**		**Q 32.**		**Q 33.**	a
Q 34.	b	**Q 35.**		**Q 36.**	c	**Q 37.**	c
Q 38.	c	**Q 39.**	b	**Q 40.**	b		
Integer type							
Q 41.		**Q 42.**		**Q 43.**		**Q 44.**	
Q 45.							