

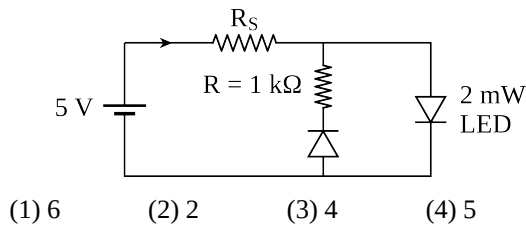
## JEE MAIN SEMICONDUCTOR ELECTRONICS — SPECIAL PURPOSE DIODES: ZENER DIODE, LED, PHOTODIODE, SOLAR CELL — PYQS

**Max. Marks: 32**
**Questions: 8**

### Section A (MCQ) — 6 questions

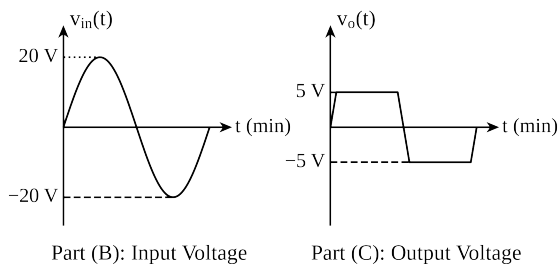
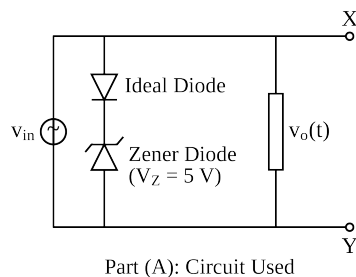
- Q.1** The maximum rated power of the LED is 2 mW and it is used in the circuit with input voltage of 5 V as shown in the figure below. The current through resistance  $R_S$  is 0.5 mA. The minimum value of the resistance of  $R_S$ , to ensure that the LED is not damaged is \_\_\_\_\_ k $\Omega$ .

[JEE Main 2026 (Online) 6th April Morning Shift]


 Scan or tap for the full solution 

- Q.2** For the given circuit (shown in part (A)) the time dependent input voltage  $v_{in}(t)$  and corresponding output  $v_o(t)$  are shown in part (B) and part (C), respectively. Identify the components that are used in the circuit between points X and Y.

[JEE Main 2026 (Online) 2nd April Morning Shift]

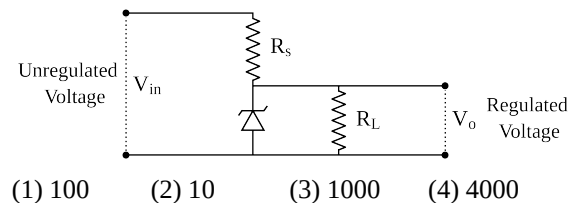


- (1) X   Y
- (2) X   Y
- (3) X   Y
- (4) X   Y

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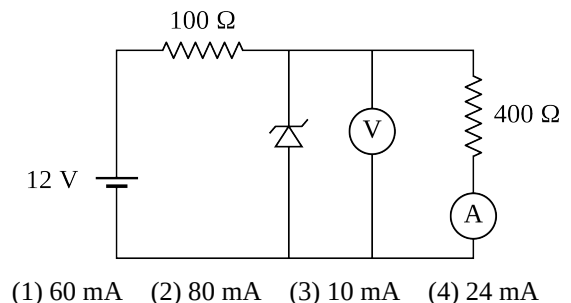
- Q.3** The following diagram shows a Zener diode as a voltage regulator. The Zener diode is rated at  $V_Z = 5$  V and the desired current in load is 5 mA. The unregulated voltage source can supply up to 25 V. Considering the Zener diode can withstand four times the load current, the value of resistor  $R_S$  (shown in circuit) should be \_\_\_\_\_  $\Omega$ .

[JEE Main 2026 (Online) 23rd January Morning Shift]


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- Q.4** In the following circuit, the reading of the ammeter will be (Take Zener breakdown voltage = 4 V)

[JEE Main 2025 (Online) 7th April Morning Shift]


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- Q.5** A zener diode with 5 V zener voltage is used to regulate an unregulated dc voltage input of 25 V. For a 400  $\Omega$  resistor connected in series, the zener current is found to be 4 times load current. The load current ( $I_L$ ) and load resistance ( $R_L$ ) are :

[JEE Main 2025 (Online) 2nd April Morning Shift]

- (1)  $I_L = 0.02 \text{ mA}$ ;  $R_L = 250 \Omega$   
 (2)  $I_L = 10 \text{ A}$ ;  $R_L = 0.5 \Omega$   
 (3)  $I_L = 10 \text{ mA}$ ;  $R_L = 500 \Omega$   
 (4)  $I_L = 20 \text{ mA}$ ;  $R_L = 250 \Omega$

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full solution



**Q.6** 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 :

[JEE Main 2025 (Online) 24th January Morning Shift]

- (1) A, C, E Only                      (2) B, E Only  
 (3) A, C Only                        (4) B, D, E Only

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### Section B (Numerical) — 2 questions

**Q.7** A diode has Zener voltage of 10 V and maximum power dissipation of 0.5 W, then the minimum resistance to be used in series with this diode for safety when it is connected to a 25 V power supply is \_\_\_\_\_  $\Omega$ .

[JEE Main 2026 (Online) 4th April Evening Shift]

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**Q.8** A voltage regulating circuit consisting of Zener diode, having breakdown voltage of 10 V and maximum power dissipation of 0.4 W, is operated at 15 V. The approximate value of protective resistance in this circuit is \_\_\_\_\_  $\Omega$ .

[JEE Main 2026 (Online) 24th January Morning Shift]

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## ANSWER KEY

### Section A (MCQ) — 6 questions

| Ques. | 1 | 2 | 3 | 4 | 5 | 6 |  |  |  |  |  |
|-------|---|---|---|---|---|---|--|--|--|--|--|
| Ans.  | 2 | 2 | 3 | 3 | 3 | 2 |  |  |  |  |  |

### Section B (Numerical) — 2 questions

| Ques. | 7   | 8   |  |  |  |  |  |  |
|-------|-----|-----|--|--|--|--|--|--|
| Ans.  | 300 | 125 |  |  |  |  |  |  |