Rizee
THE PERFECT GUIDE

10 MOST PROBABLE TOPIC ANALYSIS FOR JEE MAINS 2021 APRIL ATTEMPT

PHYSICS

A Product of MyLearning Plus Pvt. Ltd.

Topic-1

Rizee
THE PERFECT GUIDE

Feb-21

Topic Name

P-N JUNCTION DIODE

Total Questions
05

Chapter Name

SEMICONDUCTOR ELECTRONICS: MATERIALS, DEVICES AND SIMPLE CIRCUITS

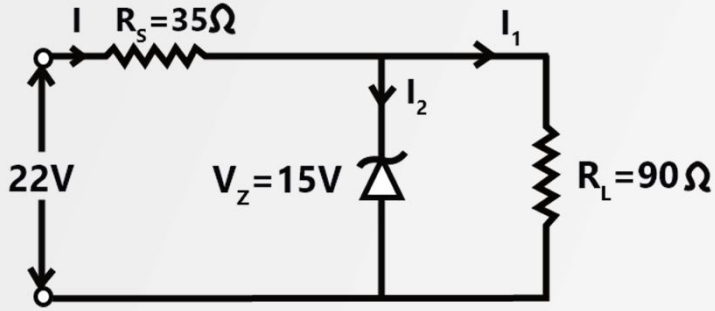
March-21

Topic Name

P-N JUNCTION DIODE

Total Questions
01

1. 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 _____.



$V_{circuit} = V_{in} - V_Z$

$= 22 - 15 = 7V$

$I = \frac{7}{35} = 1/5$

$V_{out} = 15V$

$I_1 = \frac{V_0}{R_L} = \frac{15}{90}$

$= 1/6$

$I_2 = I - I_1$

$= \frac{1}{5} - \frac{1}{6} = \frac{1}{30}$

$P = V_Z I_2 = 15 \times \frac{1}{30} = 0.5W = 5 \times 10^{-1}$

Topic-2

Rizee
THE PERFECT GUIDE

Feb-21

Topic Name

TRANSISTORS

Total Questions
02

Chapter Name

SEMICONDUCTOR ELECTRONICS: MATERIALS, DEVICES AND SIMPLE CIRCUITS

March-21

Topic Name

TRANSISTORS

Total Questions
03

2. In a transistor if increase in emitter current is 4 mA and corresponding increase in collector current is 3.5 mA. Find β

(A) 0.875

(B) 0.5

(C) 7

(D) 1

$\beta = \frac{\Delta I_C}{\Delta I_B}$

$I_E = I_C + I_B$

$I_B = I_E - I_C = 4 - 3.5 = 0.5\,mA$

$\beta = \frac{3.5}{0.5} = 7$

Topic-3

Rizee
THE PERFECT GUIDE

Feb-21

Topic Name

DIGITAL ELECTRONICS
(LOGIC GATES)

Total Questions
03

Chapter Name

SEMICONDUCTOR ELECTRONICS: MATERIALS, DEVICES AND SIMPLE CIRCUITS

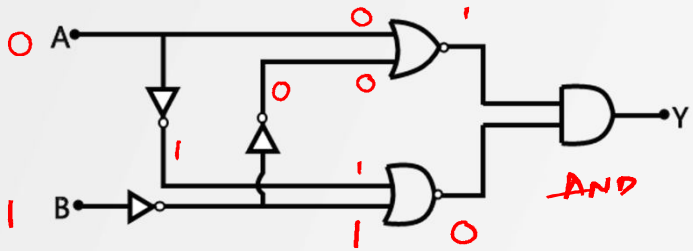
March-21

Topic Name

DIGITAL ELECTRONICS
(LOGIC GATES)

Total Questions
04

3. 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 _____.



Topic-4

Rizee
THE PERFECT GUIDE

Feb-21

Topic Name

POWER IN AC CIRCUIT: THE POWER FACTOR

Total Questions
01

Chapter Name

ALTERNATING CURRENT

March-21

Topic Name

POWER IN AC CIRCUIT: THE POWER FACTOR

Total Questions
01

4. In a series LCR circuit, the inductive reactance (X_L) is 10 Ω and the capacitive reactance (X_C) is 4 Ω. The resistance (R) in the circuit is 6 Ω. The power factor of the circuit is :

(A) $\frac{1}{2}$

(B) $\frac{1}{2\sqrt{2}}$

(C) $\frac{1}{\sqrt{2}}$

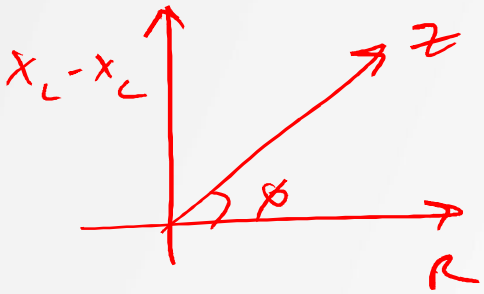
(D) $\frac{\sqrt{3}}{2}$

$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

$$= \sqrt{6^2 + (10-4)^2}$$

$$= 6\sqrt{2}$$

P.F : $\cos\phi = \frac{R}{Z}$



$$\cos\phi = \frac{6}{6\sqrt{2}} = \frac{1}{\sqrt{2}}$$

Topic-5

Rizee
THE PERFECT GUIDE

Feb-21

Topic Name

TRANSFORMER AND LC OSCILLATIONS

Total Questions
03

Chapter Name

ALTERNATING CURRENT

March-21

Topic Name

TRANSFORMER AND LC OSCILLATIONS

Total Questions
03

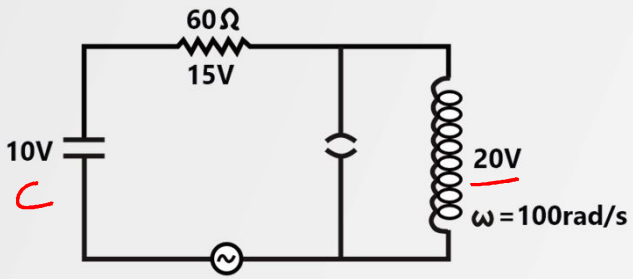
5. Find values of L and C? (All given values are RMS)

(A) 0.8 H, 500 μF

(B) 0.8 H, 250 μF

(C) 0.4 H, 250 μF

(D) 1.33 H, 500 μF



$V = \sqrt{V_R^2 + (V_L - V_C)^2}$

$V = \sqrt{15^2 + (20 - 10)^2}$

$= \sqrt{15^2 + 10^2}$

$i = \frac{V_R}{R} = \frac{15}{60} = \frac{1}{4} A$

$X_L = \omega L$

$Z = \frac{V}{i} = \sqrt{R^2 + (X_L - X_C)^2}$

$V_L = i X_L \Rightarrow 20 = \frac{1}{4}[\omega L]$

$80 = 100 \times L$

$L = \frac{80}{100} = 0.8 H$

$X_C = \frac{1}{\omega C}$

$C = 500 \mu F$

Topic-6

Rizee
THE PERFECT GUIDE

Feb-21

Topic Name

REPRESENTATION OF AC CURRENT AND VOLTAGE BY

Total Questions
01

Chapter Name

ALTERNATING CURRENT

March-21

Topic Name

REPRESENTATION OF AC CURRENT AND VOLTAGE BY

Total Questions
01

6. The current flowing in a wire is given as $I = I_1 \sin \omega t + I_2$. Find the rms value of current?

(A) $\frac{(I_1^2+I_2^2)^{1/2}}{\sqrt{2}}$

(B) $\frac{(I_1^2+I_2^2)^{1/2}}{2}$

(C) $\frac{(I_1^2-I_2^2)^{1/2}}{\sqrt{2}}$

(D) $\frac{(I_1^2-I_2^2)^{1/2}}{2}$

$$I_{rms}^2 = \frac{\int I^2 dt}{\int dt}$$

$$I_{rms}^2 = \frac{(I_1^2 + I_2^2)}{2}$$

$$= \frac{(I_1^2 + I_2^2)^{1/2}}{\sqrt{2}}$$

Topic-7

Rizee
THE PERFECT GUIDE

Feb-21

Topic Name

BOHR'S ATOMIC MODEL, HYDROGEN SPECTRA AND ATOMIC EXCITATIONS BY COLLISIONS

Total Questions
01

Chapter Name

ATOMS

March-21

Topic Name

BOHR'S ATOMIC MODEL, HYDROGEN SPECTRA AND ATOMIC EXCITATIONS BY COLLISIONS

Total Questions
04

7. H-atom is free to move and it's electron is in state n = 5. Find recoil speed of atom when electron jumps from n = 5 to n = 1

(A) 4.35 m/sec

(B) 1.2 m/sec

(C) 13.06 m/sec

(D) 0.435 m/sec

$E = (13.6)\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$ MeV

$= 13.6\left[\frac{1}{1^2} - \frac{1}{5^2}\right] = 13.6\left[\frac{24}{25}\right]$

$E = E_{atom} : \frac{1}{2} mv^2$

Topic-8

Rizee
THE PERFECT GUIDE

Feb-21

Topic Name

THE LINE SPECTRA OF THE HYDROGEN ATOM

Total Questions
04

Chapter Name

ATOMS

March-21

Topic Name

THE LINE SPECTRA OF THE HYDROGEN ATOM

Total Questions
02

8. The first three spectral lines of H-atom in the Balmer series are given $\lambda_1, \lambda_2, \lambda_3$ considering the Bohr atomic model, the wave lengths of first and third spectral lines $\left(\frac{\lambda_1}{\lambda_2}\right)$ are related by a factor of approximately $x \times 10^{-1}$. The value of x, to the nearest integer, is _____.

$$\frac{1}{\lambda_1} = R\left[\frac{1}{2^2} - \frac{1}{3^2}\right] \qquad \frac{1}{\lambda_2} = R\left[\frac{1}{2^2} - \frac{1}{4^2}\right]$$

$$\frac{\lambda_1}{\lambda_3} = 1.5 \qquad \frac{1}{\lambda_3} = R\left[\frac{1}{2^2} - \frac{1}{5^2}\right]$$

Topic-9

Rizee
THE PERFECT GUIDE

Feb-21

Topic Name

WHEATSTONE BRIDGE AND METERBRIDGE

Total Questions
01

Chapter Name

CURRENT ELECTRICITY

March-21

Topic Name

WHEATSTONE BRIDGE AND METERBRIDGE

Total Questions
02

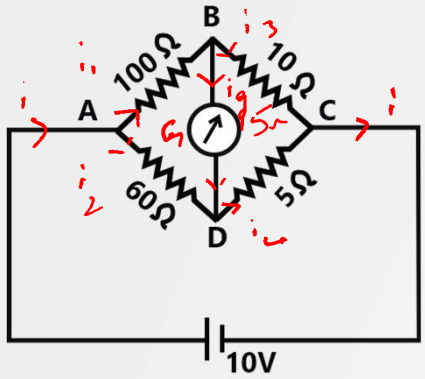
9. The four arms of a Wheatstone bridge have resistances as shown in the figure. A galvanometer of 15 Ω resistance is connected across BD. Calculate the current through the galvanometer when a potential difference of 10V is maintained across AC.

(A) 2.44 μA

(B) 2.44 mA

(C) 4.87 mA

(D) 4.87 μA



$= i_g$

KVL ABDA

$-i_1(100) - i_g(15) + i_2(60) = 0$ — (1)

BCDB

$-i_3(10) + i_4(5) + i_g(15) = 0$ — (2)

ABCA

$-i_1(100) - i_3(10) + 10 = 0$ — (7)

ADCA

$-i_2(60) - i_4(5) + 10 = 0$ — (8)

at A $\quad i = i_1 + i_2$ — (3)

at B $\quad i_1 = i_3 + i_g$ — (4)

at D $\quad i_2 + i_g = i_4$ — (5)

at C $\Rightarrow i_3 + i_4 = i$ — (6)

Topic-10

Rizee
THE PERFECT GUIDE

Feb-21

Topic Name

RESISTIVITY OF VARIOUS MATERIALS

Total Questions
01

Chapter Name

CURRENT ELECTRICITY

March-21

Topic Name

RESISTIVITY OF VARIOUS MATERIALS

Total Questions
01

10. A resistor of length "l" is stretched by 25 %. Find % change in its resistance?

(A) 56 %

(B) 50 %

(C) 60 %

(D) 40 %

$$R = \frac{\rho l}{A} = \frac{\rho l}{V/l} = \frac{\rho l^2}{V}$$

$V \rightarrow$ Volume

$$R \propto l^2$$

$$l_1 = l \; ; \; l_2 = \frac{125}{100} l_1$$

$$\frac{R_2}{R_1} = \left(\frac{l_2}{l_1}\right)^2 = \left(\frac{5}{4}\right)^2 = \frac{25}{16} \Rightarrow R_2 = \frac{25}{16} R_1$$

$$\frac{R_2 - R_1}{R_1} \times 100 = \frac{\frac{25}{16} R_1 - R_1}{R_1} \times 100 = 56\%.$$