माध्यमिक शिक्षा मण्डल, मध्यप्रदेश, भोपाल

वर्ष—2019

परीक्षार्थी द्वारा भरा जावे ↓

परीक्षा का विषय	विषय कोड	परीक्षा का माध्यम
Physics	210	English

परीक्षार्थी द्वारा भरा जावे →

पुस्तिका का क्रमांक 319-

में परीक्षार्थी का रोल नम्बर

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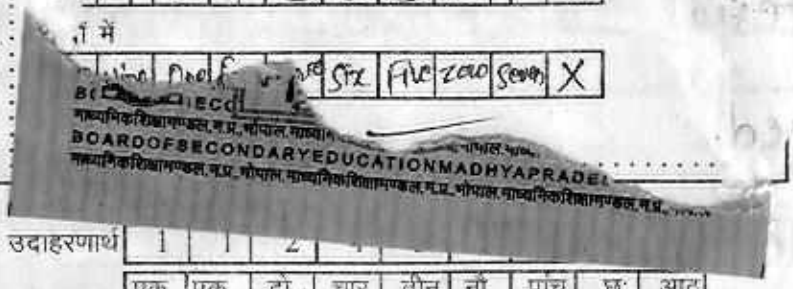
में



उदाहरणार्थ

1	1	2						
एक	एक	दो	चार	तीन	नौ	पाँच	छः	आठ

केन्द्राध्यक्ष/सहायक केन्द्राध्यक्ष एवं पर्यवेक्षक द्वारा भरा जावे →

क :– पूरक उत्तर पुस्तिकाओं की संख्या अंकों में 2 शब्दों में Two

ख :– परीक्षार्थी का कक्ष क्रमांक 03

ग :– परीक्षा का दिनांक 14 03 2019

परीक्षा का नाम एवं परीक्षा केन्द्र क्रमांक की मुद्रा

हायर सेकेण्डरी परीक्षा

केन्द्र क्रमांक–112094

पर्यवेक्षक का नाम एवं हस्ताक्षर	केन्द्राध्यक्ष / सहायक केन्द्राध्यक्ष के हस्ताक्षर
Barkha	

परीक्षक एवं उपमुख्य परीक्षक द्वारा भरा जावे ↓

परीक्षक एवं उपमुख्य परीक्षक द्वारा भरा जावे →

प्रमाणित किया जाता है कि मूल्यांकन के समय पूरक उत्तर पुस्तिकाओं की संख्या उपरोक्तानुसार सही पाई होलो क्राफ्ट स्टीकर क्षतिग्रस्त नहीं पाया गया तथा अन्दर के पृष्ठों के अनुरूप मुख्य पृष्ठ पर अंकों की प्रविष्टी एवं अकों का योग सही है।

निर्धारित मुद्रा : नाम, पदनाम, मोबाईल नम्बर, परीक्षक क्रमांक एवं पदांकित संस्था के नाम की मुद्रा लगाएं।

उप मुख्य [illegible] एवं निर्धारित मुद्रा : परीक्षक के हस्ताक्षर एवं निर्धारित मुद्रा

केवल परीक्षक द्वारा भरा जावे।
प्रश्न क्रमांक के सम्मुख प्राप्तांकों की प्रविष्टी करें।

प्रश्न क्रमांक	पृष्ठ क्रमांक	प्राप्तांक (अंकों में)
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कुल प्राप्तांक शब्दों में

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Question-1

Choose the correct

Ans (a) (iv) its material

(b) (iii) Uncharged.

) (iv) 9×10^{13} Joule

) (iii) Immobile ions

Ans (iii) They require antenna of large length for transmission.

Question-2

Fillups

(a) [AT]

b) Transverse

) Matter wave or de-Broglie wave

) Decreases

) Electrons

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Question-3

'A'	'B'
Kirchoff's second law	– (iii) Law of conservation of energy.
Moving coil galvanometer	– (iv) Magnetic effect of current.
Light of violet colour	– (i) Maximum deviation by prism
Light of red colour	– (v) Maximum speed in glass.
Minimum energy for electron emission	– (ii) Work function

Question-4

One sentence.

The value of Fundamental charge is $e = \pm 1.6 \times 10^{-19}$ Coulomb

Electromagnets are made by Soft iron and its alloys like Alnico which are ferromagnetic.

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The unit of self-inductance is Henry, or Webers/ampere.

The wavelength of visible light is 4000 A° - 8000 A°

Transducer is a device which converts one form of energy into another form of energy. Generally, it is used in the sense of converting a type of signal into electrical signals.

Question-5 (OR)

The order of electromagnetic waves according to increasing wavelength is —

Gamma (γ) rays < X-rays < UV rays < Visible light < Infra red < Micro waves < Radio waves.

Question-6 (OR)

Given, Frequency $\nu = 6 \times 10^{14}$ Hz

$h = 6.63 \times 10^{-34}$ Js

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From Planck's quantum theory,

Energy of photon $E = h\nu$

$$E = 6.63 \times 10^{-34} \times 6 \times 10^{14}$$

Ans $\boxed{E = 3.97 \times 10^{-19} \text{ Joule}}$

Question-7

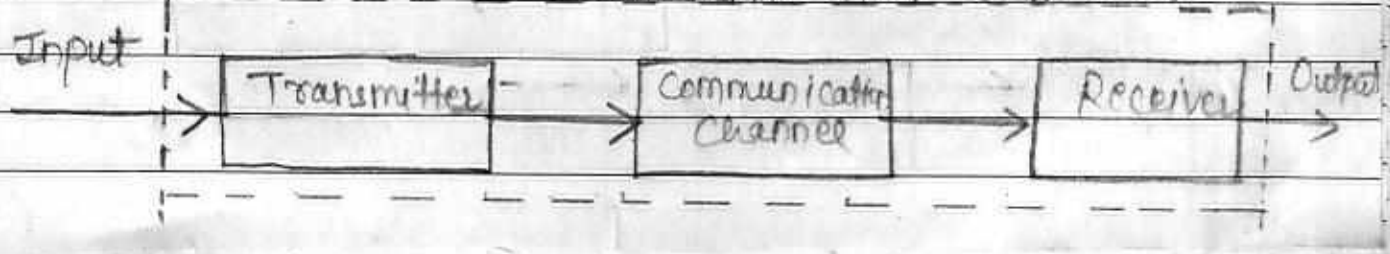
There are 3 basic elements of any communicatio system which are -

(1) Transmitter - A device that transmits the signal from one place to another and amplifies it.

(2) Communication channel - It is the medium through which a signal or message is transmitted.

(3) Receiver - Device which is used to receive the message signal from the incoming signals.

Communication System



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Question-8 (OR)

Given, Power of Ist bulb $= P_1 = 50\,W$
Power of IInd bulb $P_2 = 200\,W$

According to question, Voltage across both bulbs is same

Hence from formula $\boxed{P = \frac{V^2}{R}}$

$P_1 = \frac{V^2}{R_1}$ — (I) $\Rightarrow$ $P_1 R_1 = V^2$ — (1)

$P_2 = \frac{V^2}{R_2}$ $\Rightarrow$ $P_2 R_2 = V^2$ — (II)

From eq (1) & (II) $P_1 R_1 = P_2 R_2$

$50 \times R_1 = 200 \times R_2$

or $\frac{R_1}{R_2} = \frac{200}{50}$

So $\boxed{\frac{R_1}{R_2} = \frac{4}{1}}$

Hence $\boxed{R_1 : R_2 = 4 : 1}$

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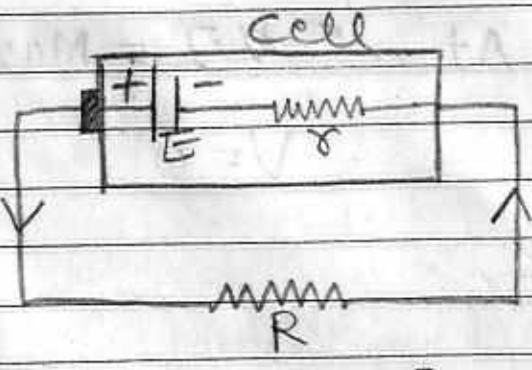
Question -9 (OR)

Consider a cell of emf E, internal resistance r, is connected across a resistance R.
Current flowing in the circuit is I



As we know,

Current = $\frac{\text{Emf}}{\text{Total resistance}}$

So $I = \frac{E}{R+r}$ (Since r and R are in Series)

$IR + Ir = E$ —— (I)

And terminal voltage across resistance R is

$V = IR$ —— (II) (From Ohm's law)

From eq (I) & (II)

$V + Ir = E$

or $\boxed{V = E - Ir}$

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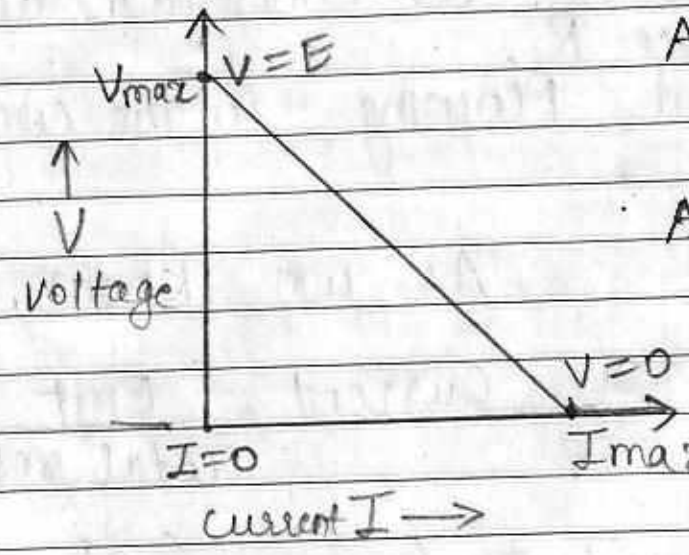
Hence, we can say that as the current from cell increases, voltage across resistance R decreases.



At I = 0

$V_{max} = EmF$

At I = Maximum

V = 0

B S E

Question - 10

~~Given~~, ~~u = 10 cm (-ve)~~

Given, distance of object u = 10cm (-ve)

Radius of curvature R = 20cm (-ve)

So focal length $f = \frac{R}{2} = \frac{-20}{2} = 10cm$ (-

From Mirror formula -

$$\boxed{\frac{1}{u} + \frac{1}{v} = \frac{1}{f}}$$

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$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

$$\Rightarrow \frac{1}{-10} = \frac{1}{-10} + \frac{1}{v}$$

$$\Rightarrow \frac{1}{v} = -\frac{1}{10} + \frac{1}{10}$$

$$\Rightarrow \frac{1}{v} = \frac{-1+1}{10} \Rightarrow \frac{1}{v} = \frac{0}{10}$$

Distance of image $\boxed{v = \infty}$

Hence image will be formed at infinity.

Since the object is kept at focus and image is forming at infinity, the image will be real, inverted and highly magnified.

Magnification for mirror-

$$m = \frac{-v}{u} = -\frac{(-\infty)}{-10} = \frac{-\infty}{10}$$

$$\boxed{m = -\infty}$$

So magnification $\boxed{m = -\infty}$

-ve sign indicates that the image is real and inverted.

Question - 11 (OR)

Electromagnet	Permanent magnet
1) Electromagnets are temporary magnets which show magnetism till the currents flows through them.	1) Permanent magnets show permanent magnetism and their magnetism is forever.
2) Soft iron is used to make ~~permanent~~ electromagnets.	2) Steel is used to make permanent magnets.
3) Its polarity i.e. the position of north and south poles can be changed.	3) The position of poles can't be changed.
4) It can be used to generated very very high magnetic field.	4) They can't be used to generate extremely high magnetic field.

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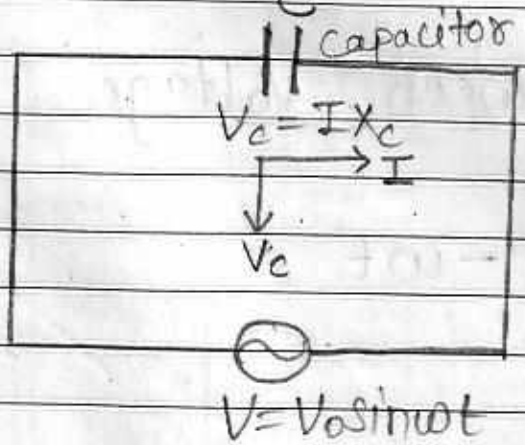
Their magnetic property is more	5) Their magnetic property is limited to certain limit

Question-12 (OR)

Consider a AC circuit containing capacitor of capacitance C whose reactance is X_c



Let the equation of AC voltage source is

$$V = V_0 \sin\omega t \quad \text{---(1)}$$

Capacity $C = \frac{q}{V}$

$$q = CV \quad \text{---(2)}$$

So $q = CV_0 \sin\omega t$

Current $I = \frac{dq}{dt} \Rightarrow I = \frac{d(CV_0 \sin\omega t)}{dt}$

$$I = CV_0 \frac{d(\sin\omega t)}{dt}$$

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$$I = CV_0 \cos\omega t \cdot \frac{d}{dt}(\omega t)$$

$$I = \omega C V_0 \cos\omega t$$

or $$I = \omega C V_0 \sin\left(\omega t + \frac{\pi}{2}\right)$$

$\left(\sin(90°+\theta) = \cos\theta\right)$

Hence

Current $$\boxed{I = I_0 \sin\left(\omega t + \frac{\pi}{2}\right)}$$ ——(iii)

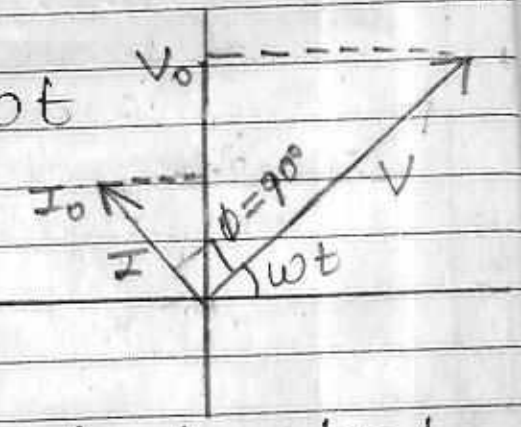
where $I_0 = \omega C V_0$

Phase difference between Voltage and Current →

$$\phi = \left(\omega t + \frac{\pi}{2}\right) - \omega t$$

$$\Rightarrow \phi = \frac{\pi}{2}$$

$$\Rightarrow \boxed{\phi = 90°}$$



Hence current I leads ahead to voltage V by $\underline{\phi = 90°}$

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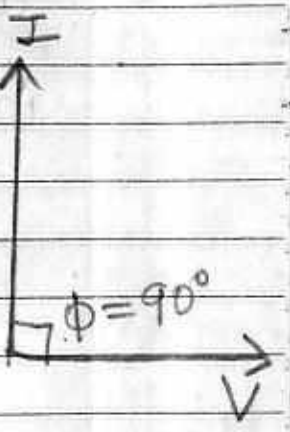
Capacitive reactance X_c →

Peak value of current $I_0 = \omega C V_0$

or $\frac{V_0}{I_0} = \frac{1}{\omega C}$ ——— (IV)

From Ohm's law $\frac{V}{I} = R$

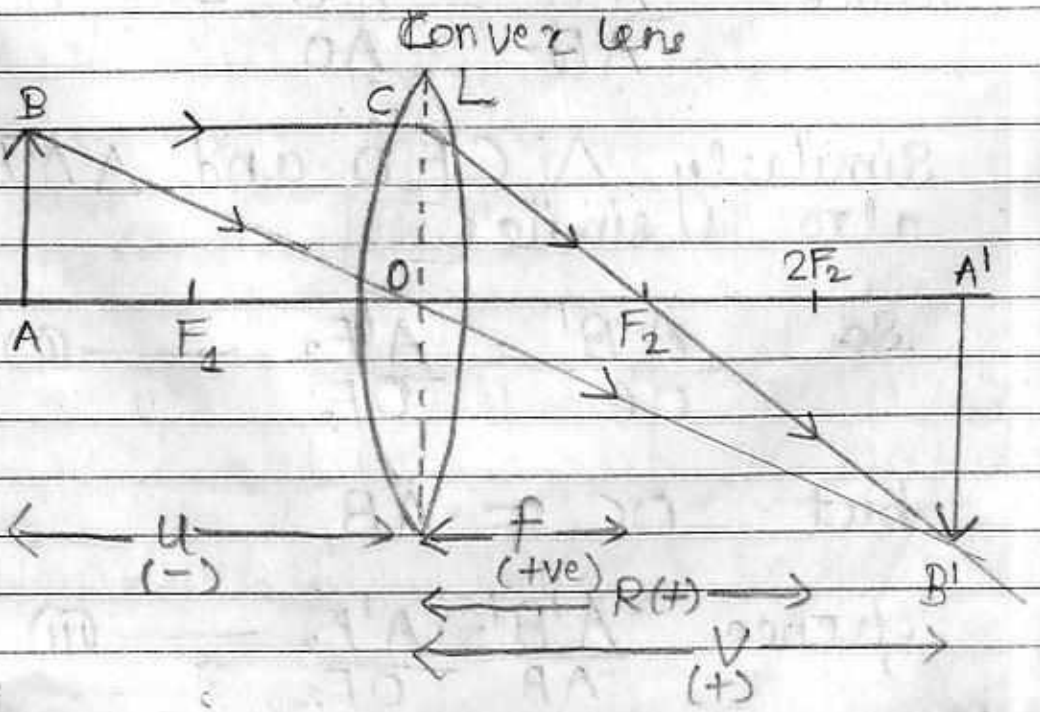
Comparing with eqn (IV)



Reactance $\boxed{X_c = \frac{1}{\omega C}}$

or $\boxed{X_c = \frac{1}{2\pi f C}}$ $(\omega = 2\pi f)$

Question-13



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Consider a convex lens L

an object AB is placed at distance u From the lens b/w Focus F, and 2F, So its real inverted and magnified image A'B' is obtained at distance v on the other side of lens.

Focal length of lens = f

Radius of curvature = R

In the diagram,

ΔAOB and $\Delta A'OB'$ are similar

hence $$\frac{A'B'}{AB} = \frac{A'O}{AO} \quad \text{——(I)}$$

Similarly ΔCF_2O and $\Delta A'F_2B'$ are also similar.

So $$\frac{A'B'}{OC} = \frac{A'F_2}{OF_2} \quad \text{——(II)}$$

but $OC = AB$

hence $$\frac{A'B'}{AB} = \frac{A'F_2}{OF_2} \quad \text{——(III)}$$

From eqn (I) & (III)

$$\frac{A'O}{AO} = \frac{A'F_2}{OF_2} \quad \text{— (IV)}$$

$A'O = V$ (+ve) $\quad 2F_2 = R$

$AO = u$ (−ve) $\quad OF_2 = f$

$$\frac{V}{-u} = \frac{A'O - OF_2}{OF_2}$$

$$\Rightarrow \frac{-V}{u} = \frac{V - f}{f}$$

$$\Rightarrow -Vf = uV - uf$$

$$\Rightarrow uf - Vf = uV \quad \text{— (V)}$$

Divide by uvf on both sides

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

or $$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

f = Focal length
V = Distance of image
u = Distance of object

Hence this is the required formula.

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Question -15

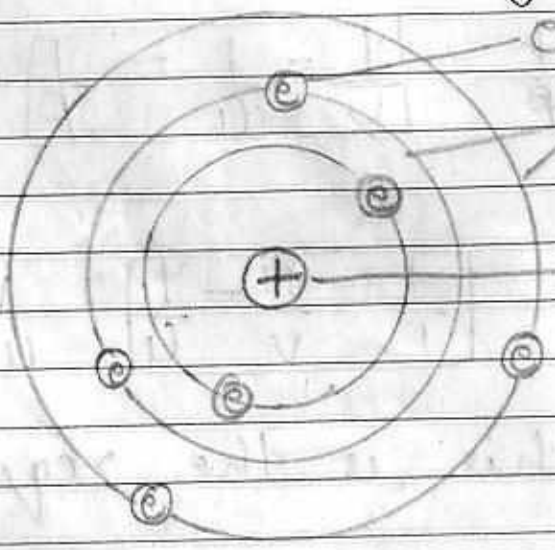
Scientist Neils Bohr gave his atomic model in the year 1913.

He proposed some postulates on which his atomic model is based.

These postulates are as follows.

B S E (1) Electrons in the atom do not revolve in any orbit. They revolve in some specific orbits. These orbits are called stationary or non-radiating orbits.

Electrons revolving in these orbits do not radiate any energy.



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(2) Electron can revolve only in those orbits for which its angular momentum around nucleus is an integer multiple of $\frac{h}{2\pi}$

i.e Angular momentum

$$mvr = \frac{nh}{2\pi}$$ where h = planck's Constant

$n = 1, 2, 3 - - - -$

and n is the principal quantum number.

This is called Bohr's Quantum condition

(3) Electron donates or accepts energy in the form of packets called quanta.

When it jumps from lower energy orbit to higher energy orbit, it absorbs the energy.

When electrons comes from higher energy orbit to lower energy orbit it emits energy in the form of

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radiations.

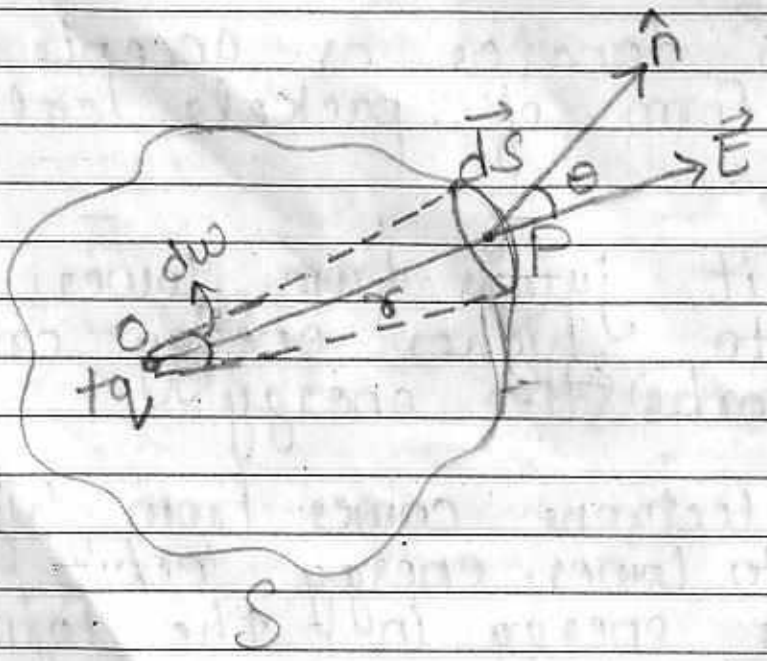
(4) When electron jumps from n^{th} orbit to p^{th} orbit (where $E_n >> E_p$), then it emits energy in form of electromagnetic radiations which is equal to the energy difference of these two Orbits.

$$E = E_n - E_p$$

$$\Rightarrow \boxed{E_n - E_p = h\nu}$$

This is Bohr's Frequency condition.

Question-16 (OR)



Gauss' law –

According to this law :–

"The total electric flux coming out of a closed body is $\frac{1}{\epsilon_0}$ times of the total charge present inside the body."

i.e. electric flux $\boxed{\Phi_E = \frac{q}{\epsilon_0}}$

Proof – Consider a body S in which charge +q is present at point O

Let a surface of area dS at point P at a distance r from point O.

Electric field at point P due to charge q is

$$E = \frac{1}{4\pi\epsilon_0} \frac{q}{r^2} \quad \text{—— (1)}$$

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Electric flux through the surface dS

$$\phi_E = \int E A \cos\theta$$

$$\phi_E = \int E\, dS \cos\theta \quad \text{—— (11)}$$

$$\phi_E = \int \frac{1}{4\pi\epsilon_0} \frac{q}{r^2} dS \cos\theta$$

$$\phi_E = \frac{1}{4\pi\epsilon_0} q \int \frac{dS\cos\theta}{r^2}$$

$$\phi_E = \frac{1}{4\pi\epsilon_0} q \int d\omega \qquad \left(d\omega = \frac{dS\cos\theta}{r^2} \text{ where } d\omega \text{ is solid angle}\right)$$

$$\phi_E = \frac{1}{4\pi\epsilon_0} q \times 4\pi \qquad (\text{For any closed surface } d\omega = 4\pi)$$

$$\boxed{\phi_E = \frac{q}{\epsilon_0}}$$

In presence of medium $\boxed{\phi_E = \frac{q}{\epsilon_0 K}}$

where K is dielectric Constant of the medium

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Question-17(OR)

Transformer -

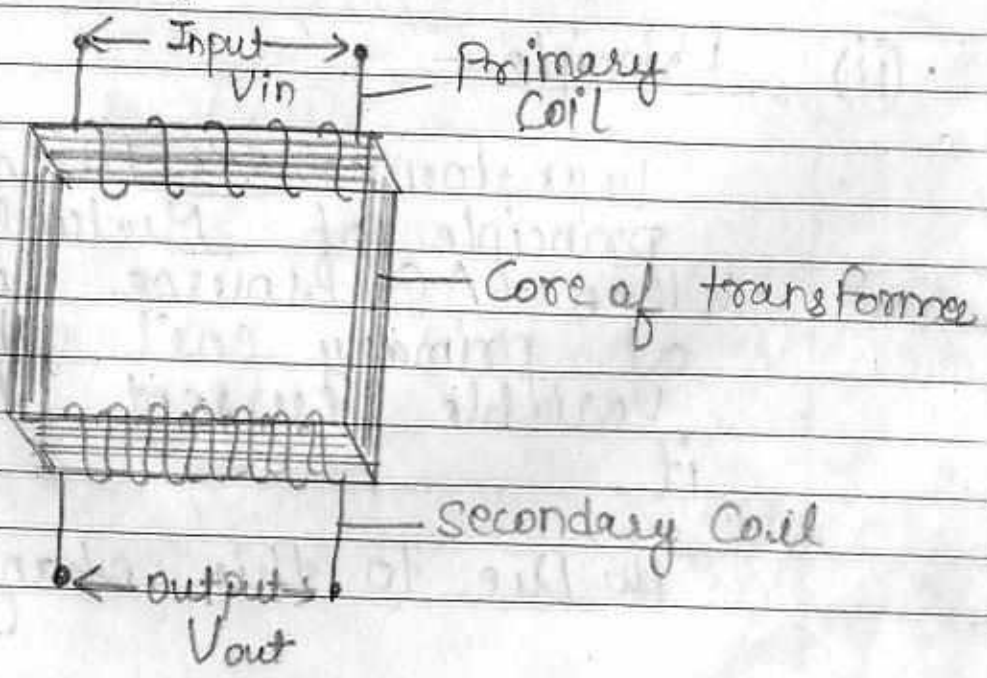
Transformer is a device which is used to increase the or decrease the magnitude of AC voltage or alternating current. Keeping power constant.

(i) Labelled diagram.

Transformers are of two types.

1) Step-up transformer -

It is used to increase the value of AC voltage and to decrease current in output



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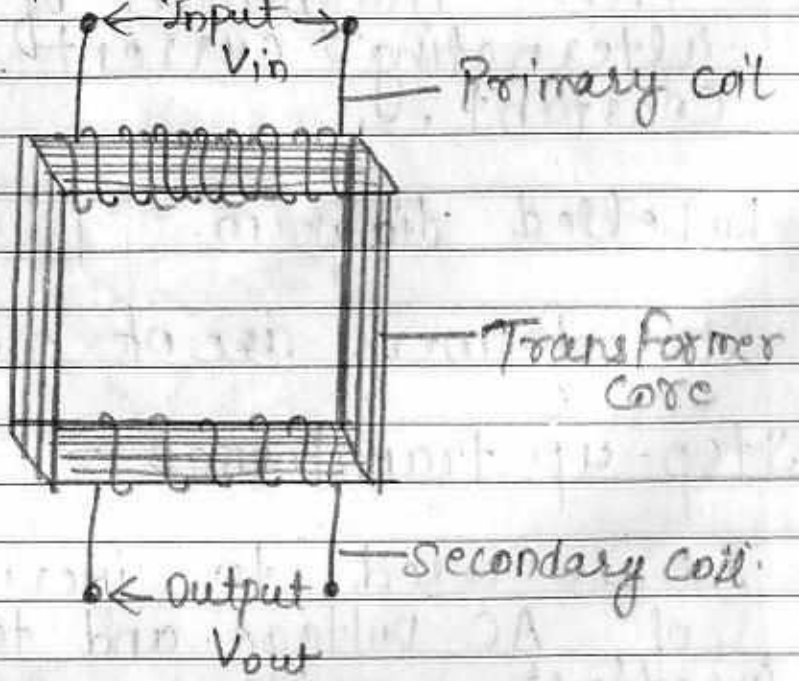
2) Step-down transformer -

It is used to decrease the value of AC voltage and to increase current in output.



B S E

(ii) Principle -

Transformer is based on the principle of Mutual induction. When AC source is applied at primary coil, then / ∝ Variable current flows through it.

∴ Due to this changing current,

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a variable magnetic flux get linked with the secondary coil. Due to mutual induction, induced current flows in the secondary coil and output is obtained across secondary coil.

(iii) Formula of transformer ratio –

Number of turns in primary coil = N_p
Number of turns in secondary coil = N_s

∴ Induced emf in primary coil

$$E_p = -N_p \frac{d\phi}{dt} \quad \text{— (i)}$$

Induced emf in secondary coil

$$E_s = -N_s \frac{d\phi}{dt} \quad \text{— (ii)}$$

If magnetic flux of primary coil is completely linked with secondary coil, then

from eq (i) & (ii) $\frac{E_p}{E_s} = \frac{N_p}{N_s}$

If resistance of coil is negligible

then emf = Voltage

So $E_p = V_p$

$E_s = V_s$

Hence $\frac{E_p}{E_s} = \frac{N_p}{N_s} = \frac{V_p}{V_s}$

If current in primary coil is I_p

current in secondary coil is I_s

So $\frac{E_p}{E_s} = \frac{N_p}{N_s} = \frac{V_p}{V_s} = \frac{I_p}{I_s} = \gamma$

γ is the transformer ratio

(iv) Energy loss :→

(a) Copper loss -

Loss of energy occurs in the form of heat due to the resistance of wire wounded over the coil

To minimise it, wire is take as thick as possible.

(b) Iron loss -

Energy loss occurs in the form of heat due to eddy current in the core.

To minimise it, thin sheets of laminated core is taken.

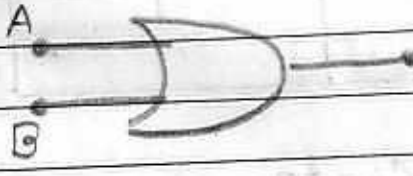
Question-18

Logic gates -

Logic gates are the types of circuits which are used to obtain a desired output according to the type of condition in which they are applied in the devices or circuits in a certain logical conditions.

(1) OR Gate

Symbol



Truth table -

Input		Output
A	B	Y = A + B
0	0	0
0	1	1
1	0	1
1	1	1

Boolean expression

$Y = A + B$

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(2) AND Gate

Symbol :- 

Boolean expression $Y = A \cdot B$

Truth table -

Input		Output
A	B	$Y = A \cdot B$
0	0	0
1	0	0
0	1	0
1	1	1

(3) NOT Gate

Symbol 

Boolean expression $Y = \bar{A}$

Truth table -

Input	Output
A	$Y = \bar{A}$
0	1
1	0

माध्यमिक शिक्षा मण्डल, मध्यप्रदेश, भोपाल

परीक्षार्थी द्वारा भरा जावे ↓

परीक्षा का विषय: Physics | विषय कोड: 210 | परीक्षा का माध्यम: English | परीक्षा का दिनांक: 14/03/2019

स्टीकर तीर के निशान ↓ से मिलाकर लगायें

परीक्षार्थी द्वारा भरा जावे →

...हायर सेकेण्डरी परी...
...न्द्र क्रमांक–142094
...क का नाम एवं हस्ताक्षर
Barkha
...यक्ष / सहायक केन्द्राध्यक्ष के हस्ताक्षर
Ramaiya

मुख्य उत्तर पुस्तिका के अंतिम पृष्ठ क्रमांक.....तक कुल प्राप्तांक [ ]

(4) NAND Gate

Symbol – 

Boolean expression $Y = \overline{A \cdot B}$

Truth table –

Input		Output
A	B	$Y = \overline{A \cdot B}$
0	0	1
1	0	1
0	1	1
1	1	0

पृष्ठ के अंको का योग

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Question - 14

Scientist Huygen's gave his wave theory of light in which he considered light in the form of wave and proposed some principles on the his wave theory is based

(1) Light travels in the form of wave motion

(2) Waves arise or produced from the source of light and travels through making wavefronts in the medium.

(3) Wavefronts are the locus in the medium on which particles vibrate in the same phase.

(4) Line perpendicular to the wavefront, give the direction of light rays.

(5) New wavelets arise from the wavefront which are called secondary wavelets. The previous waves pass their energy to the new secondary wavelets and these secondary wavelets propagate with the speed

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of light.

(6) The secondary wavelets ~~produ~~ produced from a wavefront form new wavefronts and act as a new source of light.

(7) Thus light propagates making new wavefronts instantaneously and producing new wavelets.