माध्यमिक शिक्षा मण्डल, मध्यप्रदेश, भोपाल

परीक्षार्थी द्वारा भरा जायें ↓

परीक्षा का विषय	विषय कोड			परीक्षा का माध्यम
PHYSICS	2	1	0	ENGLISH

कर तीर के निशा

र पुस्तिका का क्रमांक – 321 – 1723684

परीक्षार्थी का रोल नम्बर

में

	2	4	5	2	8	0	5	9

में

	TWO	FOUR	FIVE	TWO	EIGHT	ZERO	FIVE	NINE

नीचे दिये गये उदाहरण अनुसार रोल नम्बर भरें।

उदाहरणार्थ

1	1	2	4	3	9	5	6	8
एक	एक	दो	चार	तीन	नौ	पाँच	छः	आठ

क – पूरक उत्तर पुस्तिकाओं की संख्या अंको में [X] शब्दों में [X]

ख – परीक्षार्थी का कक्ष क्रमांक [05]

ग – परीक्षा की दिनांक [21] [02] [2022]

2022

परीक्षा का नाम एवं परीक्षा केन्द्र क्रमांक की मुद्रा

451025

हायर सेकेण्डरी परीक्षा

पर्यवेक्षक का नाम एवं हस्ताक्षर	केन्द्राध्यक्ष/सहायक केन्द्राध्यक्ष के हस्ताक्षर
Kalpana Sood	

परीक्षक एवं उपमुख्य परीक्षक द्वारा भरा जायें ↓

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

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

उप मुख्य परीक्षक के हस्ताक्षर एवं निर्धारित मुद्रा	परीक्षक ...
V. Choubey 151106	... (007612)

नोट :– ''हायर सेकेन्डरी परीक्षा में केवल वाणिज्य संकाय के विषयों तथा ह... में प्रायोगिक विषय को छोड़कर शेष विषयों हेतु नियमित एवं स्वाध्यायी छात्र... पत्र 100 अंकों का होगा किन्तु नियमित छात्रों को 100 अंक के प्राप्तांक का 80... स्वाध्यायी छात्रों को 100 अंक के प्राप्तांक ही अंकसूची में प्रदर्शित किये जायें

विशेष नोट :– सिलाई खुली हुई अथवा क्षतिग्रस्त उत्तर पुस्तिका को न तो पर्यवेक्षक वितरण करे और न ही छात्र उपयोग में ले। ऐसी उत्तर पुस्तिका में लिखें उत्तरों का मूल्यांकन नहीं किया जायेगा। परीक्षार्थी द्वारा भरा जायें → केन्द्राध्यक्ष/सहायक केन्द्राध्यक्ष एवं पर्यवेक्षक द्वारा भरा जायें → परीक्षक एवं उपमुख्य परीक्षक द्वारा भरा जायें →

केवल परीक्षक द्वारा भरा जायें

प्रश्न क्रमांक के सम्मुख प्राप्ताकों की प्रविष्ठी करें

प्रश्न क्रमांक	पृष्ठ क्रमांक	प्राप्ताक (अंको में)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
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28		

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Question-1
Answer-1

(a) (iii) Zener diode

(b) (ii) Copper wire

(c) (ii) is more than

(d) (iii) 1.6×10^{-19} C

(e) (ii) the current on the coil

(f) (iv) none of the above

(g) (i) an accelerated charge

Question-2
Answer-2

(i) gamma rays

(ii) bar magnet

(iii) wheat stone bridge

(iv) concave

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(v) $Y = \overline{A \cdot B}$

(vi) scattering

(vii) parallel

Question-3
Answer-3

(i) Magnifying power of compound microscope – (d) $-\frac{v_0}{u_0}\left(1 + \frac{D}{f_e}\right)$

(ii) Brewster's law – (i) Polarisation of light

(iii) Infrared radiations – (f) Hershel

(iv) Electron Volt – (j) Unit of energy

(v) Dynamo – (c) Electromagnetic induction

(vi) Ammeter – (g) Instrument of measuring current

(vii) Electrical power – (e) VI

Question-4
Answer-4

Power = $\frac{1}{\text{focal length}}$

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As the power and focal length of lens are inversely proportional, on increasing the focal length, power decreases.

(ii) NOT gate is known as inversion gate.

(iii) law of conservation of energy

(iv) The minimum frequency by which the electrons are ejected out from the metal surface is known as threshold frequency.

(v) The magnification power of astronomical telescope can be increased by making the objective lens thin and of large focal length and the eyes lens thick of small focal length.

(vi) The potential ~~decreases~~ increases due to insulated medium.

(vii) The reason for origin of displacement current is time-varying electric field.

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Question-5
Answer-5

Ans – Limitations of Ohm's Law :-

1. Ohm's law is applicable only for metals, ~~or the materials which~~

2. For applying Ohm's law, the external conditions such as length, temperature should be constant.

Question-6
Answer-6

~~One Ampere is~~

Ans – The current is said to be one Ampere when one Coulomb of charge flows through a conductor in one seconds.

$$1A = 1C/s$$

Question-7
Answer-7

Ans- Given,

Polarising angle (ip) = 30°

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Applying Brewster's law,

$\tan i_p = \mu$ OR $\tan 30 = \mu$

~~tan 3~~ $\mu = \frac{1}{\sqrt{3}}$

$i_p + r = 90°$ $\frac{\sin i_p}{\sin r} = \frac{1}{\sqrt{3}}$

$30° + r = 90°$ $\sin 30 \times \sqrt{3} = \sin r$

$r = 90 - 30$ $\sqrt{3}/2 = \sin r$

$r = 60°$

$\therefore$ angle of refraction $= 60°$ $(\sin 60 = \sqrt{3}/2)$

$r = 60°$

Question-8

Answer-8

Ans

	Self Induction	Mutual Induction
1.	When the current or flux in the coil changes, the current is induced in the coil itself. This is called self induction.	When the current in the coil changes, the current is induced in the another coil kept in vicinity of the coil. This is called mutual induction.
2.	Denoted by (L), one coil is required.	Denoted by (M), two coils are required.

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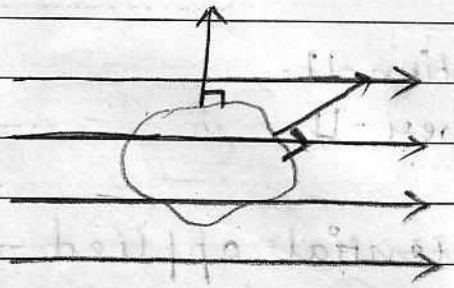
Question - 9

Answer - 9

Ans -



The area vector of the surface is perpendicular to the electric field.

$\phi = E \cdot S$

$\phi = ES \cos\theta$

$\phi = ES \cos 90^\circ$

$\cos 90^\circ = 0$

$\phi = ES\,(0)$

$\phi = 0$

$\boxed{\phi = 0}$

Question - 10

Answer - 10

Ans - Red coloured light has longest wavelength and it is least scattered. It can travel larger distances without scattering. The light used in danger signals should travel long distances without scattering

प्रश्न क्र.

so as to avoid accidents. Therefore, danger signal is always red.

Question-11
Answer-11

Ans- The negative potential applied at the anode to stop the current flow or to stop photoelectric effect is known as stopping potential

Question-12
Answer-12

Ans-

N-type semiconductor	P-type semiconductor
1. When a pure tetravalent atom is doped with ~~int~~ pentavalent impurities such as (Phosphorus, Arsenic etc.) then it is known as N-type semiconductor.	1. When a pure tetravalent atom such as silicon is doped with trivalent impurities such as (Boron, Gallium etc.) then it is known as P-type semiconductor.
2. Electrons are majority charge carriers and holes are minority charge carriers.	Holes are majority charge carriers and electrons are minority charge carriers.

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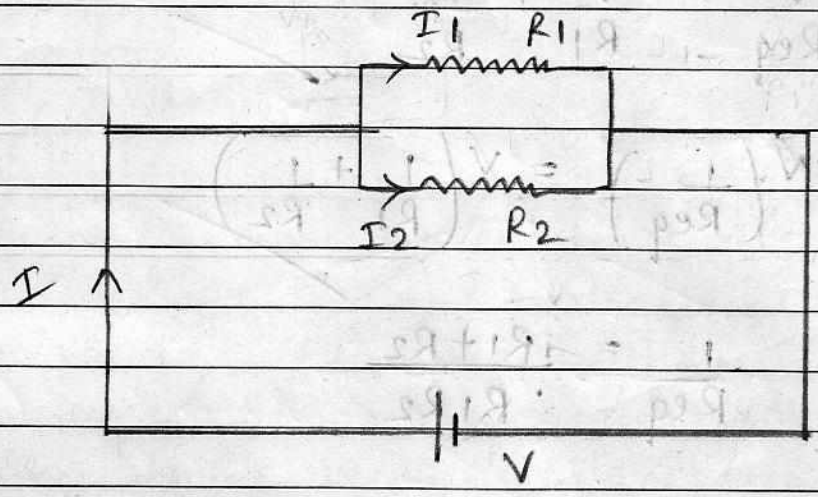
Question - 13

Answer - 13

Ans –



Let two resistance, R_1 and R_2 connected in parallel.

Potential difference across R_1 and R_2 is same because they are connected in parallel.

Current I_1 is passing through R_1 and current I_2 is passing through R_2.

$$I_1 = \frac{V_1}{R_1} \quad -① \qquad I_2 = \frac{V_2}{R_2} \quad -②$$

$$V_1 = V_2 = V$$

$$I = \frac{V}{R_{eq}}$$

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Adding equations 1 and 2

$$\frac{V}{R_{eq}} = \frac{V}{R_1} + \frac{V}{R_2}$$

$$V\left(\frac{1}{R_{eq}}\right) = V\left(\frac{1}{R_1} + \frac{1}{R_2}\right)$$

$$\frac{1}{R_{eq}} = \frac{R_1 + R_2}{R_1 R_2}$$

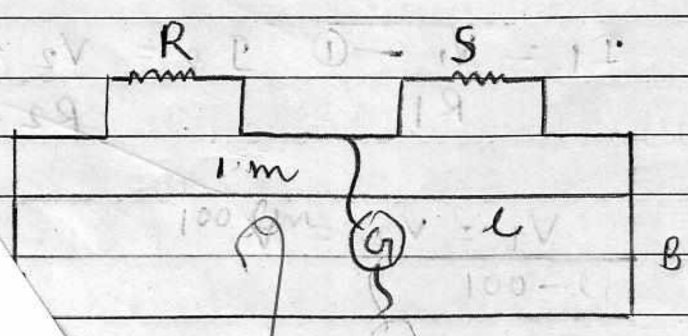
$$R_{eq} = \frac{R_1 R_2}{R_1 + R_2}$$

Hence proved!

Question-14

Answer-14

Ans-



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Let two resistance R and S connected across the wire AB of legth 100 cm

Working Principle :- Wheat stone bridge. A jockey is connected to the meter bridge. The length of the jockey is first touched near end A, it deflects towards the other side. When it is touched at near end B, it deflects towards other side. There is a point on wire AB at which jockey is touched then the meter-bridge becomes balanced and the length is known as balancing length. If one resistance R is known then the unknown resistance S can be found out.

$$\frac{lx}{(100-l)x} = \frac{R}{S}$$

$$\frac{l}{100-l} = \frac{R}{S}$$

$$S = R\left(\frac{100-l}{l}\right)$$

Precautions –

1. All the connections should be made tight.
2. The jockey should not be rubbed with wire.

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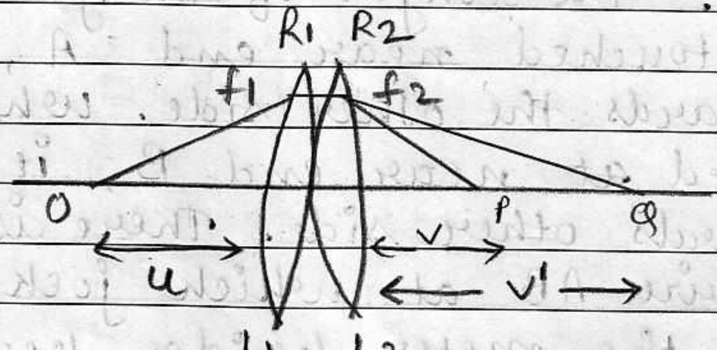
Question -15
Answer -15

Ans-



Two convex lens L1 and L2 are combined. The focal length of L1 is f1 and the focal length of L2 is f2.

An object is kept at O at a distance u from the lens. Its image is formed at v'. Now v' serves as object for lens L2 and final image is formed at v.

~~$\frac{1}{f1}$~~

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

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$$\frac{1}{f_1} = \frac{1}{v'} - \frac{1}{u} \quad \text{---} (1)$$

$$\frac{1}{f_2} = \frac{1}{v} - \frac{1}{v'} \quad \text{---} (2)$$

Add equation 1 and 2:

$$\frac{1}{f_1} + \frac{1}{f_2} = \frac{1}{v'} - \frac{1}{u} + \frac{1}{v} - \frac{1}{v'}$$

$$\frac{1}{f_1} + \frac{1}{f_2} = \frac{1}{v} - \frac{1}{u}$$

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

$$\frac{1}{f_1} + \frac{1}{f_2} = \frac{1}{f}$$

$$\frac{f_1 + f_2}{f_1 f_2} = \frac{1}{f}$$

$$f = \frac{f_1 f_2}{f_1 + f_2}$$

Hence proved!

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Question-16
Answer-16

Ans -

Given,
Current $I = 4A$

Inductance $L = 100 H$

Energy $U = \frac{1}{2} L i^2$

$U = \frac{1}{2} \times 100 \times 4 \times 4$

$= 800 J$

Energy stored in coil $= 800 J$

Question - 17
Answer - 17

Ans – Logic Gates – Logic gates are the digital gates which provide a logical output when input is given.

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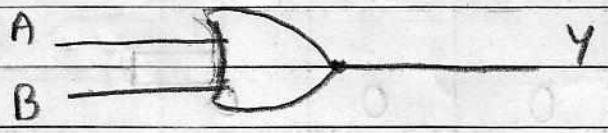
OR Gate –

Symbol =



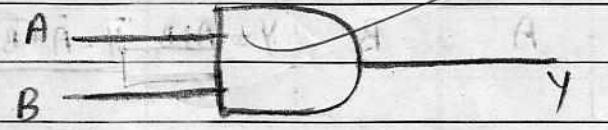
Boolean formula = $Y = A + B$

Truth table

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

AND Gate –

Symbol =



Boolean formula $Y = A \cdot B$

प्रश्न क्र.

Truth Table.

A	B	Y = A·B
0	0	0
1	0	0
0	1	0
1	1	1

NOR Gate -

Symbol -

Boolean formula $\overline{Y} = \overline{A + B}$

Truth Table

A	B	Y = A+B	$\overline{Y} = \bar{A} + \bar{B}$
0	0	0	1
1	0	1	0
0	1	1	0
1	1	1	0

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$|E_1| = |E_2|$

$E_{net} = 2E\cos\theta$

$\cos\theta = \frac{B}{H} = \frac{l}{\sqrt{l^2+r^2}}$

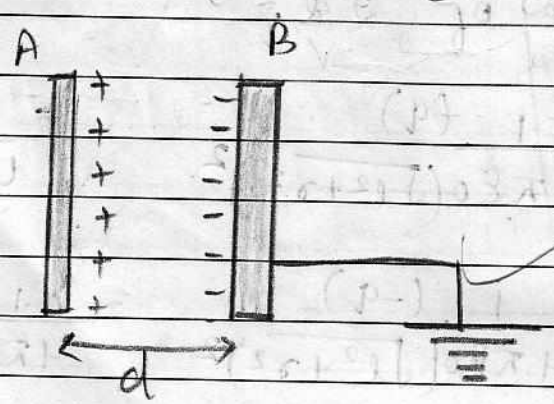
$E_{net} = \frac{2 \times q}{4\pi\varepsilon_0(l^2+r^2)} \times \frac{l}{(l^2+r^2)^{1/2}}$

$E_{net} = \frac{2ql}{4\pi\varepsilon_0(l^2+r^2)^{3/2}}$

$2ql = q(2l) = p$ = dipole moment

$E_{net} = \frac{p}{4\pi\varepsilon_0(l^2+r^2)^{3/2}}$

Ans- Capacitor - It is a device used to increase the potential of a substance without changing its size.
It is used to store energy.



There are two plates A and B.
+ve charge gets accumulated over A and
-ve charge gets accumulated on B.
Plate B is connected to earth.

We know that electric field,

$$E = \frac{\sigma}{\varepsilon_0}$$

$$Q = \sigma A$$

Potential $V = E \cdot d$ $\left[\sigma = \frac{Q}{A}\right]$

d = distance between two plates

$$V = \frac{\sigma}{\varepsilon_0} d$$

$$V = \frac{Q d}{A \varepsilon_0}$$

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

$$= \frac{Q}{\frac{Qd}{A\varepsilon_0}}$$

$$C = \frac{Q \times A\varepsilon_0}{Qd}$$

$$C = \frac{\varepsilon_0 A}{d}$$

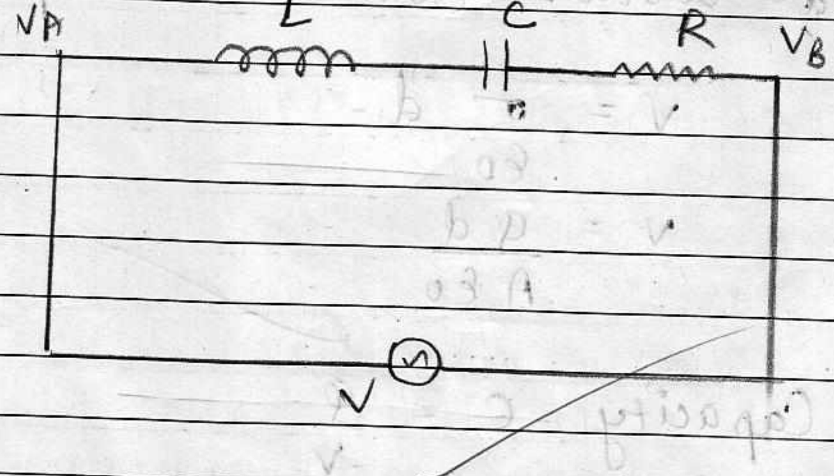
∴ Capacity of a parallel plate capacitor is $\frac{\varepsilon_0 A}{d}$, where

A = Area of the plates
d = distance between the plates
ε_0 = permittivity of free space

If a dielectric medium is filled then $\varepsilon = \varepsilon_0 . \varepsilon_r$.

Question-19
Answer-19

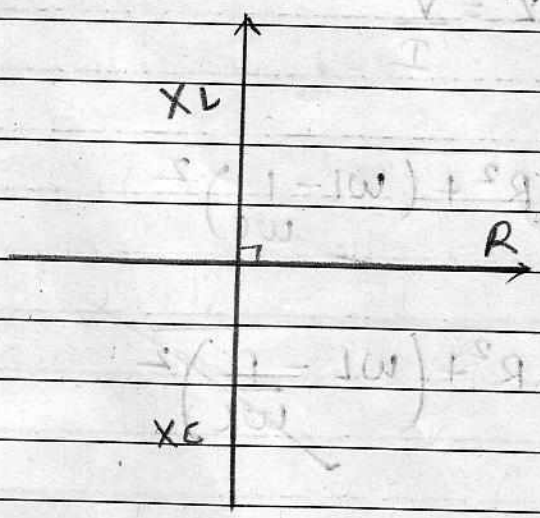
Ans-(1) Electrical Circuit →



It consists of inductor (L), capacitor (C) and resistance (R) connected across an alternating voltage

प्रश्न क्र. (2)

Phasor diagram



X_L and X_C are reactance at the phase difference of π.

$$X_L = \omega L$$

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

(b) Resultant voltage

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

$$V = \sqrt{I^2R^2 + I^2\left(\omega L - \frac{1}{\omega C}\right)^2}$$

$$V = I\sqrt{R^2 + \left(\omega L - \frac{1}{\omega C}\right)^2}$$

प्रश्न क्र. (4)

Impedence

$$Z = \frac{V}{I}$$

$$V = I\sqrt{R^2 + \left(\omega L - \frac{1}{\omega C}\right)^2}$$

$$Z = \sqrt{R^2 + \left(\omega L - \frac{1}{\omega C}\right)^2}$$

(5)

Phase difference

$$\tan\phi = \frac{V_L - V_C}{V_R} = \frac{X_L - X_C}{R}$$

$$\tan\phi = \frac{\omega L - \frac{1}{\omega C}}{R}$$

$$\phi = \tan^{-1}\frac{\left(\omega L - \frac{1}{\omega C}\right)}{R}$$

M P B S E

Question - 16

Answer - 16

Ans. Given, $E_P = 11000V$

प्रश्न क्र.

Et $E_S = 440\ V$

$N_p = 8000$

$N_S = ?$

$$\frac{E_p}{E_S} = \frac{N_p}{N_S} = \frac{I_S}{I_p}$$

$$\frac{11000}{440} = \frac{8000}{N_S}$$

$$N_S = \frac{8000 \times 440}{11000}$$

$$= 8 \times 40$$

$$= 320$$

No. of turns in secondary coil = 320