माध्यमिक शिक्षा मण्डल, मध्यप्रदेश, भोपाल

परीक्षार्थी द्वारा भरा जायें ↓

24 पृष्ठीय

परीक्षा का विषय	विषय कोड			परीक्षा का माध्यम
Physics	2	1	0	English medium

स्टीकर तीर के निशान ↓ से मिलाकर लगायें

उत्तर पुस्तिका का सरल क्रमांक – 321 – 9484

परीक्षार्थी का रोल नम्बर

अंकों में

2	2	2	6	2	5	4	6	6

शब्दों में

Two	Two	Two	Six	Two	Five	Four	Six	Six

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 02 शब्दों में दो

ख – परीक्षार्थी का कक्ष क्रमांक 12

ग – परीक्षा की दिनांक 21 02 2022

परीक्षा का नाम एवं परीक्षा केन्द्र क्रमांक की मुद्रा

हायर सेकेण्डरी परीक्षा सन् 2022 परीक्षा केन्द्र क्रमांक-291004

पर्यवेक्षक का नाम एवं हस्ताक्षर	केन्द्राध्यक्ष/सहायक केन्द्राध्यक्ष के हस्ताक्षर
जितेन्द्र भारती Jitendra	

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 पदाकिंत संस्था के नाम की मुद्रा लगाएं।

उप मुख्य परीक्षक के हस्ताक्षर एवं निर्धारित मुद्रा	परीक्षक के हस्ताक्षर एवं निर्धारित मुद्रा
Dinesh Kumbhkar U.M.S. Mob-9424518463	Shriram Sharma M.S., S.N. 15853 Mob-9981074886 Govt. H.S. School Agar

नोट :– ''हायर सेकेन्डरी परीक्षा में केवल वाणिज्य संकाय के विषयों तथा हाई स्कूल परीक्षा में प्रायोगिक विषय को छोड़कर शेष विषयों हेतु नियमित एवं स्वाध्यायी छात्रों के लिये प्रश्न पत्र 100 अंकों का होगा किन्तु नियमित छात्रों को 100 अंक के प्राप्तांक का 80% अधिमार एवं स्वाध्यायी छात्रों को 100 अंक के प्राप्तांक ही अंकसूची में प्रदर्शित किये जायेंगे।''

केवल परीक्षक द्वारा भरा जायें

प्रश्न क्रमांक के सम्मुख प्राप्ताकों की प्रविष्टी करें

प्रश्न क्रमांक	पृष्ठ क्रमांक	प्राप्ताक (अंको में)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
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23		
24		
25		
26		
27		
28		

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

प्रश्न क्र.

Ans of Q. No. 1

MCQ's

(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.) (ii) Mutual induction
(g.) (i) an accelerated charge

Fill ups

(i.) Gamma γ waves
(ii.) Bar magnet
(iii) wheatstone bridge
(iv.) 'Concave'
(v.) If A and B are inputs then,
Boolean expression for NAND gate:

$$y = \overline{A \cdot B}$$

(vi.) Scattering of light
(vii.) parallel

प्रश्न क्र.

Ans of Q. No. 3

	Colum A		Column B
(i)	Magnifying power of compound microscope	⟶ (d)	$-\frac{V_o}{f_o}\left[1+\frac{D}{f_e}\right]$
(ii)	Brewster's law	⟶ (i)	Polarization of light
(iii)	Infrared Radiation	⟶ (f)	Herschel
(iv)	Electron-Volt	⟶ (j)	Unit of energy
(v)	Dynamo	⟶ (c)	Electromagnetic induction
(vi)	Ammeter	⟶ (g)	Instrument of measuring current
	Electrical power	⟶ (e)	V.I.

प्रश्न क्र.

Ans of Q. No. 4

One word/one sentence:

(i) On increasing focal length of lens measured in meter, power of lens decreases.
i.e.

$$P = \frac{1}{f(\text{in m})}$$

(ii) 'NOT GATE' is called Inversion gate.

(iii) According to the theory of Lenz's law,
"the direction of induced current is such that it tends to oppose the cause which produces it."

(iv) The minimum frequency of the incident light which is required to eject the electrons from the metallic surface is called Threshold frequency.

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(v) From the expression of magnification power of Astronomical telescope, it is clear that on increasing the diameter of objective lens, the magnification power of astronomical telescope can be increased.

(vi) Due to an insulated medium, potential decreases.

(vii) Change in electric field (electric flux) is the reason of origin of Displacement current.

प्रश्न क्र.

Ans of Q.No. 2

Kirchoff's voltage law

According to the

Limitation of Ohm's law

1. Temperature should be constant.
2. Strains should not be produced.

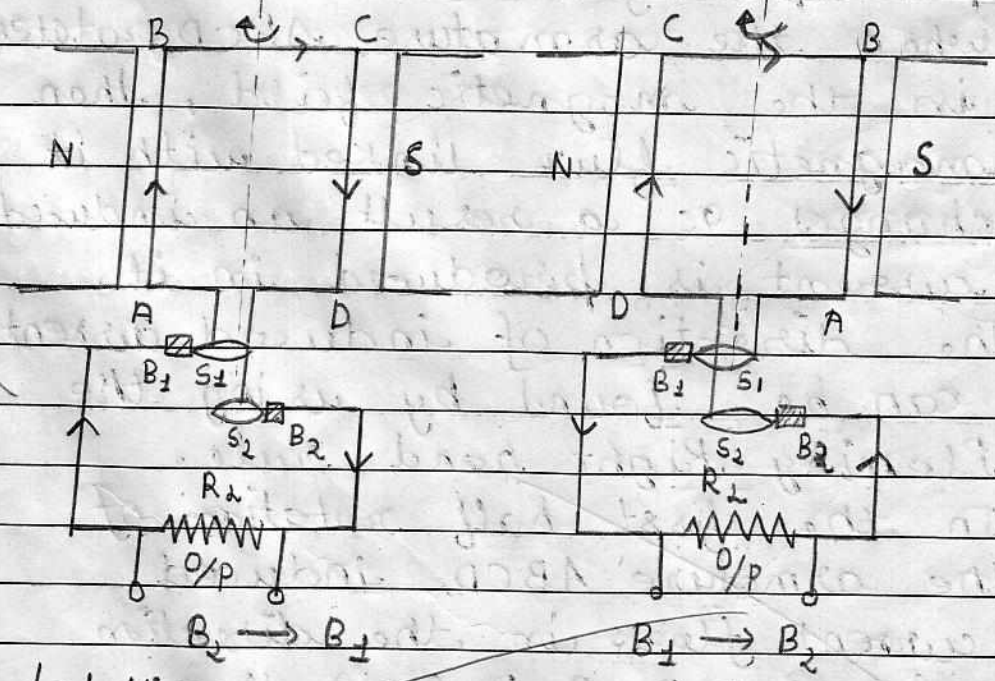
P.T.O

Ans of Q.No. 19

A.C. generator

"A device which converts the mechanical energy into electrical energy is called A.C. generator. It is based on the phenomena of em induction.

Labelled diagram:



labelling

N and S: Strong horse shoe magnet
B_1 and B_2: Carbon Brushes
S_1 and S_2: Slip rings
ABCD: Armature
R_L: Load resistance

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Components of ac generator

1. A strong horse shoe magnet N and S.
2. Armature ABCD
3. Two carbon brushes B_1 and B_2.
4. Slip rings S_1 and S_2.

Working

A.C generator is based on the principle of em induction. When the armature ABCD rotates in the magnetic field, then magnetic flux linked with it changes as a result an induced current is produced in it. The direction of induced current can be found by using the Fleming Right hand rule. In the first half rotation of the armature ABCD, induced current flows in the direction $ABCDS_2B_2R_LB_1S_1A$ thus in the external circuit, current flows from B_2 to B_1 and output is obtained across the load resistance R_L.

प्रश्न क्र.

⇒ During the second half rotation of the armature ABCD, the position of AB and CD gets interchanged and now current flows in the direction DCBA S_1 B_1 R_L B_2 S_2 D. thus in the external circuit, current flows from B_1 to B_2.

Thus, using A.C. generator, we get alternating current.

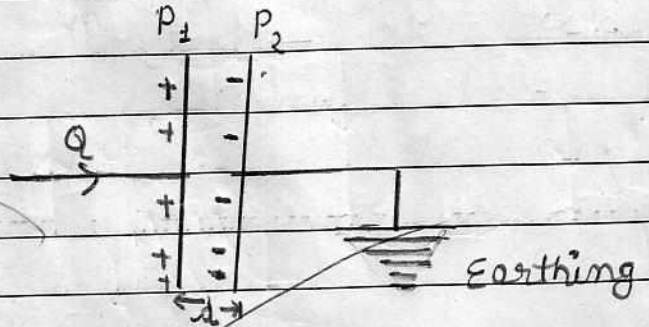
Ans of Q.No. 18

⇒ **Capacitor**

A device in which capacity of the conductor can be increased without increasing its size or in other words, a device which stores electrical energy is called Parallel plate "capacitor".

⇒ Expression for capacitance of parallel plate capacitor

Diagram



P_1 and P_2 : two parallel plates
d : Distance between two plates
Q : charge given to plate P_1

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⇒ Let us consider two parallel plates P_1 and P_2 which are placed parallel to each other seperated by a distance 'd'. Let the air is filled between two plates.

When the charge 'Q' is given to plate P_1, then negative charge is induced on the plate P_2 on the side which is close to plate P_1 while positive charge is induced on far side of plate P_2. When the plate 'P_2' is earthened then, its positive charge goes to the earth. Thus, in this way, capacity increases.

Let the area of both the plates P_1 and P_2 is 'A' and their surface charge density is 'σ'.

$$\sigma = \frac{q}{A}$$

Electric feild intensity between two plates;

$$E = \frac{\sigma}{2\varepsilon_0} + \frac{\sigma}{2\varepsilon_0}$$

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

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Due to this electric field, p.d developed will be,

$$\therefore V = E.d \quad \left[\because E = \frac{V}{d}\right]$$

where E: Electric field intensity
d: distance between plates

Putting $E = \frac{\sigma}{\varepsilon_0}$, we get

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

$$\because \left[\sigma = \frac{Q}{A}\right]$$

$$\therefore V = \frac{Q}{Ad\varepsilon_0} \quad \therefore V = \frac{Q}{A\varepsilon_0} d$$

Thus, capacity is given by -

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

$$C = \frac{Q}{\frac{Q}{Ad\varepsilon_0}} = \frac{Q}{1} \times A$$

P.T.O.

प्रश्न क्र.

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

$$C = \frac{\cancel{Q}}{1} \times \frac{A\varepsilon_0}{\cancel{Q}\,d}$$

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

It is the required expression.

Here; A: Area of plates
d: distance between two plates
ε_0: Absolute permittivity of air

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Ans of Q.No. 16 (OR)

Given:

Inductance of coil = 100 Henry

Current in the coil = 4A

To find:

Energy stored U = ?

By the formula,

$$U = \frac{1}{2} LI^2$$

Putting $L = 400$ Henry, $I = 4$ A

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

$$U = \frac{1}{2} \times 100 \times 16\ 8$$

$$U = 800 \text{ Joule}$$

Thus, the energy stored in the coil will be 800 Joule.

प्रश्न क्र.

Ans of Q.No.15

Difference between Simple microscope and Astronomical telescopes as follows:

Simple Microscope	Astronomical telescope
1. Simple microscope is used to see nearby small objects.	1. Astronomical telescope is used to see faraway objects such as astronomical bodies.
2. Focal length of eye peice is slightly greater than focal length of objective lens. i.e. $(f_e > f_o)$	2. Focal length of objective lens is much greater than the focal length of eye peice. i.e. $(f_o >> f_e)$
3. In it, $(f_e - f_o)$ is less and aperture of eye peice is more than aperture of objective lens.	3. In it, $(f_o - f_e)$ is large and aperture of eye objective lens is much larger than the aperture of eye peice.

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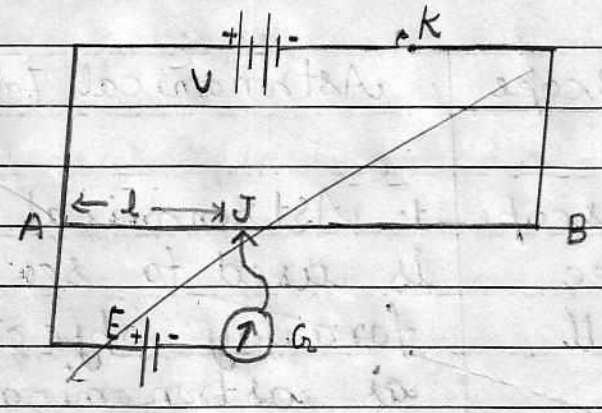
Ans of Q.No. 14 (OR)

Diagram : Electrical circuit



Labelling

AB: wire of potentiometer
E: Experimental cell
J: Jockey
G: Galvanometer
K: Key

Principle:

A device which measures the accurate p.d. between two points and emf of the cell is called Potentiometer.

Let 'AB' be the wire of potentiometer. End A of wire AB is connected with

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positive terminal while end B is connected with negative terminal of the batter. Key 'K' is connected in between.

End A is at more potential as compared to end B.
As we go from end A to end B, there is fall in potential.
Thus, fall of in potential along the wire of potentiometer is called "Potential gradient" denoted by K.

$$i.e.\ K = \frac{V}{l}$$

such that 'l' is the length of potentiometer wire and 'V' is p.d. developed.

When an experimental cell 'E' is connected with primary circuit and Galvanometer 'G' is connected with it. when the jockey 'J' is rubbed on wire AB, deflection is obtained in galvanometer. we find a point J on AB at which Galvanometer gives no deflection. It is null position.

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In this position, emf is equal to the potential developed between AJ i.e. balancing length.

Such that:

Emf of the cell = P.d. developed between A and J having length 'l'

$$E = kl$$

where K: Potential gradient
l: balancing length of wire

It is the required expression principle of potentiometer.

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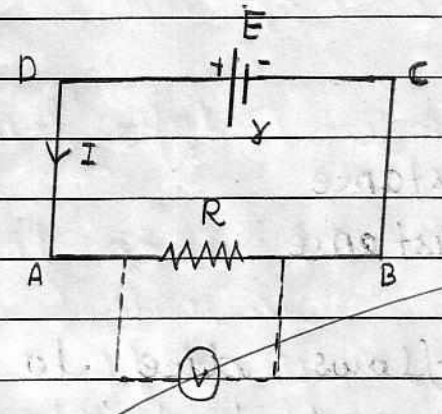
Ans of Q.No. 23 (OR)

Diagram:



Labelling:

R: External Resistance

E: Cell having emf 'E' and internal resistance 'r'

Derivation

Let us consider a cell having electromotive force 'E' and internal resistance 'r'. When an external resistance 'R' is joined in between the cell, then potential difference 'V' is developed as a result 'I' current starts flowing.

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Now,
Current drawn from the cell

$$I = \frac{E}{R+r} \quad \text{---(i)}$$

such that
E: emf of cell
r: internal resistance
R: External resistance

Now, current flows due to External Resistance 'R' and p.d. 'V'.

By ohm's law,

$$I = \frac{V}{R} \quad \text{---(ii)}$$

Such that :-
V: P.d. developed
R: External resistance

Comparing eq. (i) and (ii), we get

$$\frac{E}{R+r} = \frac{V}{R}$$

$$\frac{E}{V} = \frac{R+r}{R}$$

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$$\frac{E}{V} = \frac{R}{R} + \frac{r}{R}$$

$$\frac{E}{V} = 1 + \frac{r}{R}$$

$$\frac{E}{V} - 1 = \frac{r}{R}$$

$$r = R\left[\frac{E}{V} - 1\right]$$

such that:

R: external resistance
E: emf of the cell
V: P.d. (Potential difference)
r: internal resistance of cell

It is the required relation between electromotive force, potential difference and internal resistance of the cell.

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Ans of Q.No. 12

Difference between N-type and P-type semiconductors:

N-type semiconductor	P-type semiconductor
1. When the pentavalent impurity (P, As) is dopped with pure semiconductor (Si and Ge), then crystal so formed is called N-type semiconductor.	1. When the trivalent impurity (Al, B) is dopped with pure semiconductor (Ge and Si), then the crystal so formed is called P-type semiconductor.
2. In it, current flows due to "electrons".	2. In it, current flows due to "holes".

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Ans of Q. No. 11

Stopping potential

"The negative potential of anode plate for which photoelectric current (~~for~~ becomes zero is called "Stopping potential."

⇒ Stopping potential is not affected by intensity of incident radiation.

⇒ Stopping potential increases on increasing the 'frequency' of the incident radiation.'

Ans of Q. No. 10 (OR)

Factors affecting refractive index.

1. Nature of medium:
Denser medium has more refractive index than rarer medium.
For e.g.
$a\mu_d = 2.42$ [Refractive index of diamond]

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2. Colour or wavelength

Refractive index is inversely proportional to the wavelength of light.
such that

$$\mu \propto \frac{1}{\lambda}$$

$\therefore \lambda_R > \lambda_V$

$\therefore \boxed{\mu_V > \mu_R}$

P.T.O

माध्यमिक शिक्षा मण्

परीक्षार्थी द्वारा भरा जायें

परीक्षा का विषय	विषय कोड			
Physics	2	1	0	English

परीक्षा का दिनांक 21 | 2 | 22

स्टीकर तीर के निशान ↓ से मिलाकर लगायें

परीक्षा का नाम एवं परीक्षा केन्द्र क्रमांक की मुद्रा

परीक्षा केन्द्र क्रमांक-261004

पर्यवेक्षक का नाम एवं हस्ताक्षर

विशेष कक्षा परीक्षा सन् 2022

केन्द्राध्यक्ष/सहायक केन्द्राध्यक्ष के हस्ताक्षर

परीक्षार्थी द्वारा भरा जायें →

मुख्य उत्तर पुस्तिका के अंतिम पृष्ठ क्रमांक

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MPBSE

M P B S E

पृष्ठ

Ans of Q.No. 1

When the surface is placed parallel to the electric feild then angle between electric feild and area vector will be 90°.

such that

$$\phi_E = E\,ds\cos\theta$$

$\because \theta = 90°$

$\because \cos 90° = 0$

$$\phi_E = E\,ds\cos 90°$$

$$\phi_E = E\,ds \times 0$$

$$\boxed{\phi_E = 0}$$

P.T.O

प्रश्न क्र.

Thus, electric flux passing through a surface parallel to the electric feild is zero.

Ans of Q.No.8

Faraday's second law of em induction

"The magnitude of induced emf is directly proportional to the rate of change of magnetic flux.

Let ϕ_1 be the initial magnetic flux which in time 'dt' becomes 'ϕ_2'.

Rate of change of magnetic flux $= \frac{\phi_2 - \phi_1}{dt}$

By faraday's second law,

Induced emf $e \propto \frac{\phi_2 - \phi_1}{dt}$

$$e = -\frac{\phi_2 - \phi_1}{dt} \text{ or } e = -\frac{d\phi}{dt}$$

प्रश्न क्र.

In SJ a

Proportionality constant will be 1.

Here, negative sign indicates that induced emf opposes the change in magnetic flux.

Ans of Q.No7

Given:

$i_p = 30°$

Refra angle of refraction = ? (γ)

By the formula,

$$i_p + \gamma = 90°$$

Putting $i_p = 30°$

$$30° + \gamma = 90°$$

$$\gamma = 90° - 30°$$

$$\boxed{\gamma = 60°}$$

Thus, the angle of refraction will be 60°.

प्रश्न क्र.

Ans of Q.No. 6

Lorentz force

When a charge "q" enters in a magnetic field 'B', with velocity 'V' then, it experiences the force which is called Lorentz force.

$$F = qVB\sin\theta$$

ण्डल, मध्यप्रदेश, भोपाल

परीक्षा का विषय	विषय कोड			परीक्षा का माध्यम	परीक्षा का दिनांक		
Physics	2	1	0	English	21	2	22

स्टीकर तीर के निशान ↓ से मिलाकर लगायें

परीक्षार्थी द्वारा भरा जायें →

माध्यमिक शिक्षा मण्डल मध्यप्रदेश

परीक्षा का नाम एवं परीक्षा केन्द्र क्रमांक की मुद्रा

परीक्षा केन्द्र क्रमांक-261004

पर्यवेक्षकु का नाम एवं हस्ताक्षर जितेन्द्र भारती

केन्द्राध्यक्ष/सहायक केन्द्राध्यक्ष के हस्ताक्षर

मुख्य उत्तर पुस्तिका के अंतिम पृष्ठ क्रमांक . =

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Ans of Q. No. 17

Logic gates:

"Digital electric circuits which either allow the signal to pass through or stop it are called logic gates.

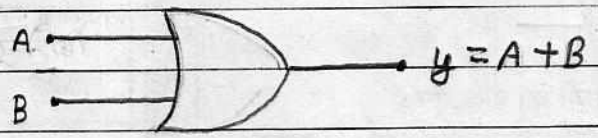
OR

Digital circuits which have one, two or more than two inputs and one ouput are called logic gates.

पृष्ठ के अंकों का योग

प्रश्न क्र.

OR GATE



Boolean formula

If A and B are inputs, then output y is given by

$$y = A + B$$

MPBSE

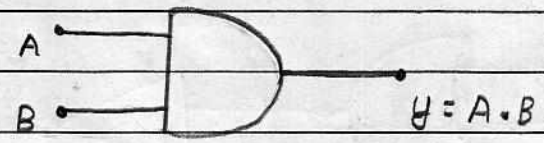
Truth table:

Inputs		output
A	B	y = A+B
0	0	0
1	0	1
0	1	1
1	1	1

प्रश्न क्र.

AND GATE

SYMBOL



Boolean expression

If A and B are inputs then output y is given by -

$$y = A.B$$

Truth table

A	B	y = A.B
0	0	0
1	0	0
0	1	0
1	1	1

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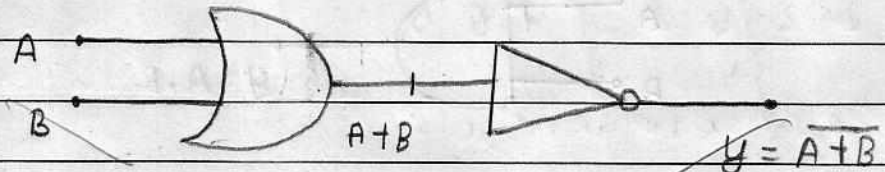
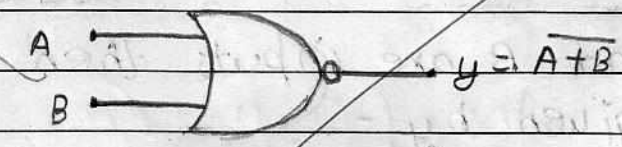
SYMBOL





Boolean expression

If A and B are inputs then output y is given by:

$$\boxed{y = \overline{A+B}}$$

Truth table:

A	B	A+B	$y = \overline{A+B}$
0	0	0	1
1	0	1	0
0	1	1	0
1	1	1	0