INDIAN SCHOOL MUSCAT

FIRST PRE-BOARD EXAMINATION

JANUARY 2020

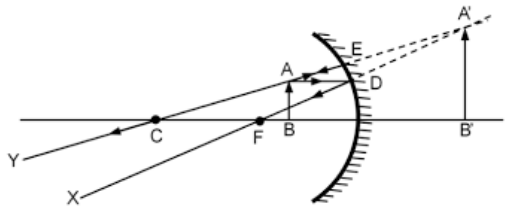
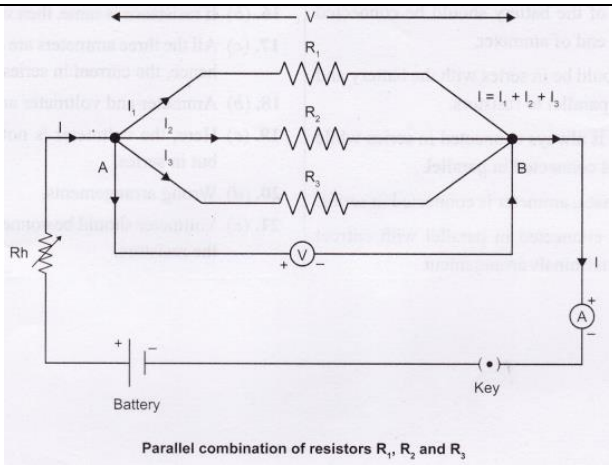
SET A

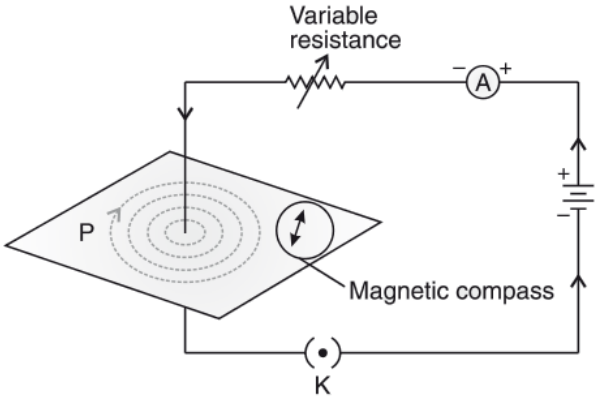
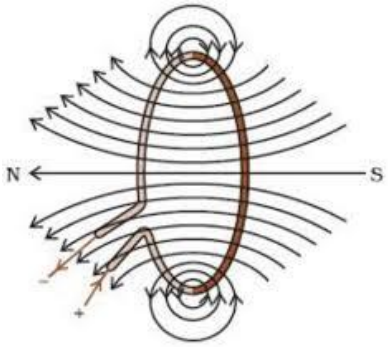
CLASS X

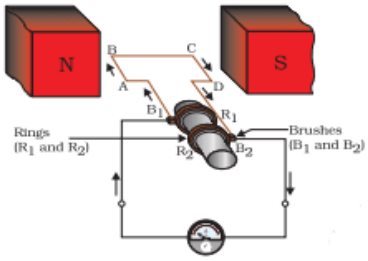
Marking Scheme – SCIENCE /PHYSICS

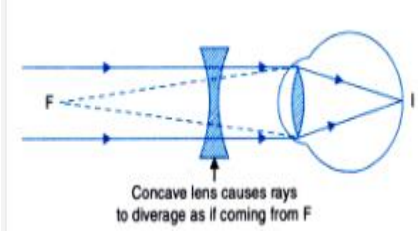
SECTION - A		
Q.NO.	ANSWER	MARKS
3	**Answer question numbers 3(a) - 3(d) on the basis of your understanding of the following paragraph and the related studied concepts.** PHY	
3(a)	Alternate energy sources	1
3(b)	Geothermal energy.	1
3(c)	Solar cell	1
3(d)	Solar panel.	1
5	(d) (OR) (b)	1
6	(c)	1
7	(a)	1
	For question numbers 13 and 14, two statements are given- one labeled *Assertion* (A) and the other labeled *Reason* (R). Select the correct answer to these questions from the codes (i), (ii).(iii) and (iv) as given below i) **Both A and R are true and R is correct explanation of the assertion.** ii) **Both A and R are true but R is not the correct explanation of the assertion.** iii) **A is true but R is false.** iv) **A is false but R is true**	
14	(iv)	1

SECTION - B

22	(i) Concave Mirror. (ii) Between the pole and focus. (iii)  	1 1 1
23	 Parallel combination of resistors R_1, R_2 and R_3 Derivation for parallel combination of resistors: Let, V be the potential difference across the two common points A and B. Then, from Ohm's law Current passing through R_1, $I_1 = V/R_1$ ...(i) Current passing through R_2, $I_2 = V/R_2$ ...(ii) Current passing through R_3, $I_3 = V/R_3$ ...(iii) If R is the equivalent resistance, then from Ohm's law, the total current flowing through the circuit is given by, $I = V/R$ ...(iv) and $I = I_1 + I_2 + I_3$ ...(v) Substituting the values of I, I_1, I_2 and I_3 in Equation (v), $\frac{V}{R} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$ = ...(vi) Cancelling common V term, one gets $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ The equivalent resistance of a parallel combination of resistance is less than each of all the individual resistances.	1 2

24	(a)  **(b)** Right hand thumb rule: If a current carrying conductor is imagined to be held in **right hand** such that **thumb** points in direction of current, then curled fingers of **hand** indicate the direction of magnetic field. If current flows in upward direction then direction will be anticlockwise. (c) Decreases (OR) (a)  (b) Mark the directions of electric current and magnetic field lines in the loop. (c) (i) Magnetic field strength becomes double, if Radius of the loop is reduced to half its original value, (ii) Magnetic field strength becomes double, if Strength of current through the loop is doubled.	1 + 1 + 1
	SECTION- C	
29	Principle: It works on the principle of electromagnetic induction. Whenever there is a change in the flux through any coil, there would be the induction of current.	1 + 3 + 1

	 Working: An electric generator, as shown is consists of a rotating rectangular coil ABCD placed between the poles of a permanent magnet. The two ends of this coil are connected to the two rings R1 and R2. The inner side of the ring is made insulated. The two conducting stationary brushes B1 and B2 are kept pressed separately on the rings R1 and R2, respectively. The two rings R1 and R2 are internally attached to an axle. The axle may be mechanically rotated from outside to rotate the coil inside the magnetic field. Outer ends of the two brushes are connected to the galvanometer to show the direction of flow of current in the external circuit. When the axle attached to the two rings is rotated such that the arm AB moves up (and the arm CD moves down) in the magnetic field produced by the permanent magnet. Let us say the coil ABCD is rotated clockwise in the arrangement shown. By applying Fleming's right-hand rule, the induced currents are set up in these arms along the directions AB and CD. Thus an induced current flows in the direction ABCD. This means that the current in the external circuit flows from B2 to B1. After half a rotation, arm CD starts moving up and AB moving down. As a result, the directions of the induced currents in both the arms change, giving rise to the net induced current in the direction DCBA. The current in the external circuit now flows from B1 to B2. Thus after every half rotation the polarity of the current in the respective arms changes. Such a current, which changes direction periodically, is called alternating current (AC). This device is called an AC generator. The function of Brushes: Brushes helps in transferring the current from inside the generator to the external circuit.	
30	(a) Myopia is the defect of the eye vision due to which a person can see the near by objects clearly but cannot see the far objects so distinctly. **Causes of myopia:** Myopia is caused due to (i) The elongation of the eyeball. (ii) Due to decrease in the focal length of the eye lens. (b)	1 1 1



(c)

Given :
Far point of the defective eye, v = -80 cm
Object distance, u = -∞ (-infinity)
To find :
Nature and power of the corrective lens.
Solution :
1/v - 1/u = 1/f
1/f = 1/(-80) - 1/(-∞)
1/f = - 1/80 + 0 *[Since, 1/-∞ = 0]*
1/f = - 1/80
f = -80 cm
Therefore, the corrective lens should be of the focal length 80 cm.
Power, P = 1 / focal length
As focal length is in centimetres, 1 m = 100 cm.
P = 100 / -80
P = -1.25 D
Therefore, the corrective lens is diverging or concave lens of power -1.25 D.

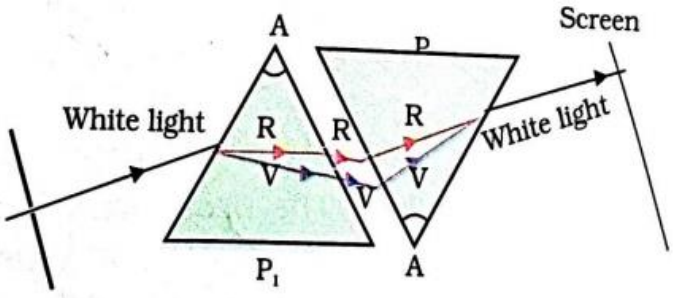
2

(OR)

(a) The cause of dispersion is the change in speed of light with wavelength. When white light enters the first surface of a Prism, light of different colours due to their different speeds in glasses gets deviated towards the base of the prism through different angles that is the Dispersion of white light into its constituent colours takes place at the first surface of prism.

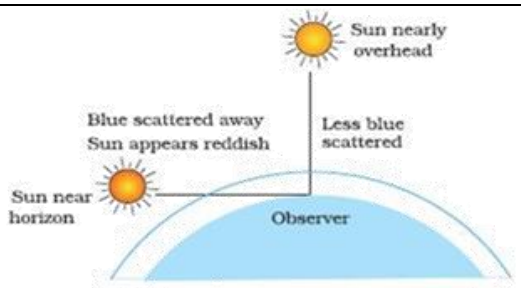
1

(b)



2

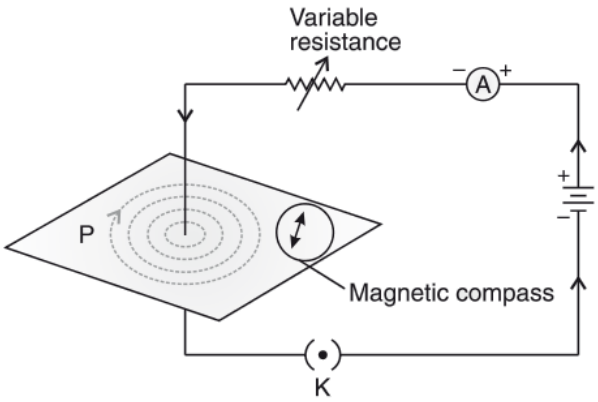
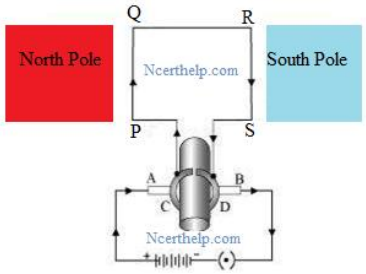
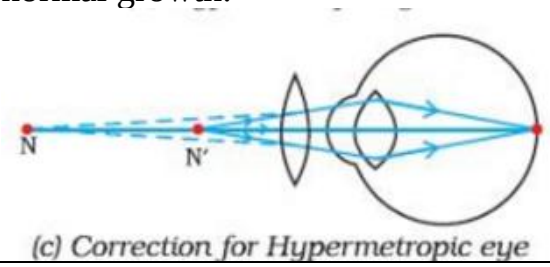
(c)

	 Sun is near the horizon and its rays cover a larger part of the atmosphere at sunrise and sunset. The intensity of the scattered light is inversely proportional to the wavelength of the colour. So, most of the blue light and components of shorter wavelength are scattered away by the particles of the atmosphere. The component of red light is least scattered because it has the longest wavelength and is visible to us. Hence, the sun looks red at the time of sunrise and sunset.	2
	End of the Question Paper	

SET- B

SECTION - A		
Q.NO.	ANSWER	MARKS
3	**Answer question numbers 3(a) - 3(d) on the basis of your understanding of the following paragraph and the related studied concepts.** PHY	
3(a)	Wind turbines.	1
3(b)	Unlike the wind the tides are predictable hence, power input is constant.	1
3(c)	Gas, coal and nuclear plants.	1
3(d)	Japan and New Zealand.	1
5	(a) (OR) (d)	1
6	(c)	1
7	(d)	1
	For question numbers 13 and 14, two statements are given- one	

	labeled *Assertion* (A) and the other labeled *Reason* (R). Select the correct answer to these questions from the codes (i), (ii).(iii) and (iv) as given below i) **Both A and R are true and R is correct explanation of the assertion.** ii) **Both A and R are true but R is not the correct explanation of the assertion.** iii) **A is true but R is false.** iv) **A is false but R is true**	
14	(iii)	1
	SECTION - B	
22	(a) Concave mirror should be used. (b) $m = -\frac{v}{u} = -\frac{(-80\ \text{cm})}{(-20\ \text{cm})} = -4$ (c) Distance between the object and its image=v-u=60cm	1 1 1
23	Series Circuit diagram.. Derivation for sries combination R = R1 + R2 + R3	1 + 2
24	(i) When coil P is moved towards Q, current will be induced in coil Q. This is because on moving P the magnetic field associated with Q increases and so a current is induced. The phenomenon is electromagnetic induction. (ii) If P is moved away from Q, the field associated with Q will decrease and a Current will be induced but in the opposite direction. (iii) Some of the methods of inducing current in the coil are (a) moving a magnet towards or away from the coil. (b) Moving a coil towards or away from a magnet. (OR) (a)	1 + 1 + 1

	 **(b)** Right hand thumb rule: If a current carrying conductor is imagined to be held in **right hand** such that **thumb** points in direction of current, then curled fingers of **hand** indicate the direction of magnetic field. If current flows in upward direction then direction will be anticlockwise. (c) Decreases	
SECTION- C		
29	 An electric motor is a device which converts electrical energy into mechanical energy. The principle behind the electric motor is based on Fleming's left hand rule. The split rings help to reverse the direction of current in the circuit. These are called the commutator.	1 + 3 + 1
30	When light rays entering the eye focus behind the retina, rather than directly on it. The eyeball of a farsighted person is shorter than normal. Many children are born farsighted, and some of them "outgrow" it as the eyeball lengthens with normal growth.  *(c) Correction for Hypermetropic eye*	1 + 1 + 3

(b) Causes of hypermetropia---It is caused by the failure of the lens to return to its normal rounded shape, or. by the eyeball being too short, with the result that the image is focused on a point behind the retina.

(c) U=-25cm

V= - 1m= - 100cm

1/f=1/v-1/u

1/f = - 1/100-1/-25

=-1/100+1/25

= - 1+4/100

= - 3/100cm^{-1}

Power: p=1/f

= 3/100 x 100D

P= 3D

The convex lens required to correct hypermetric.

(OR)

a) The cause of dispersion is the change in speed of light with wavelength. when white light enters the first surface of a Prism, light of different colours due to their different speeds in glasses gets deviated towards the base of the prism through different angles that is the Dispersion of white light into its constituent colours takes place at the first surface of prism.

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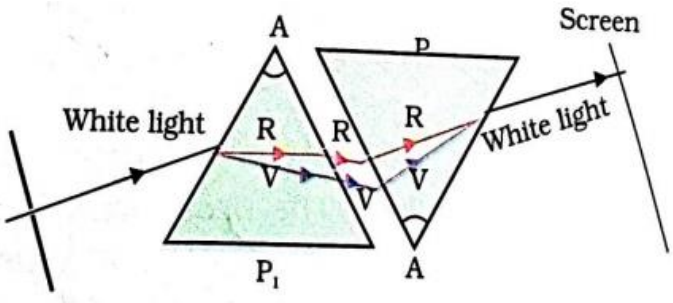
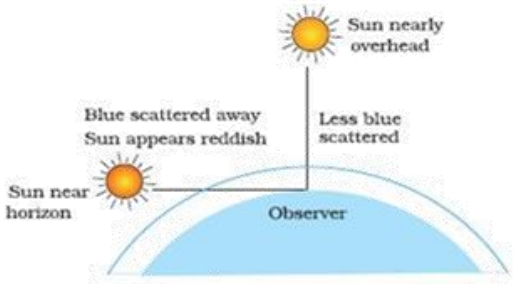


(c)



	Sun is near the horizon and its rays cover a larger part of the atmosphere at sunrise and sunset. The intensity of the scattered light is inversely proportional to the wavelength of the colour. So, most of the blue light and components of shorter wavelength are scattered away by the particles of the atmosphere. The component of red light is least scattered because it has the longest wavelength and is visible to us. Hence, the sun looks red at the time of sunrise and sunset.	
	End of the Question Paper	

SET – C

SECTION - A		
Q.NO.	ANSWER	MARKS
3	**Answer question numbers 3(a) - 3(d) on the basis of your understanding of the following paragraph and the related studied concepts.** PHY	
3(a)	Alternate energy sources	1
3(b)	Geothermal energy.	1
3(c)	Solar cell	1
3(d)	Solar panel.	1
5	(d) (OR) (b)	1
6	(d) IV	1
7	(c) at Y	1
	For question numbers 13 and 14, two statements are given- one labeled *Assertion* (A) and the other labeled *Reason* (R). Select the correct answer to these questions from the codes (i), (ii).(iii) and (iv) as given below i) Both A and R are true and R is correct explanation of the assertion.	

	ii) Both A and R are true but R is not the correct explanation of the assertion. iii) A is true but R is false. iv) A is false but R is true	
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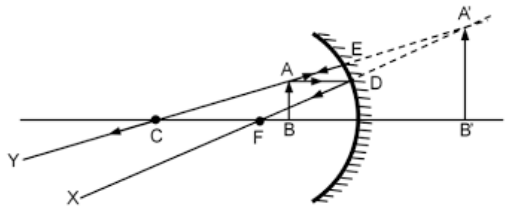
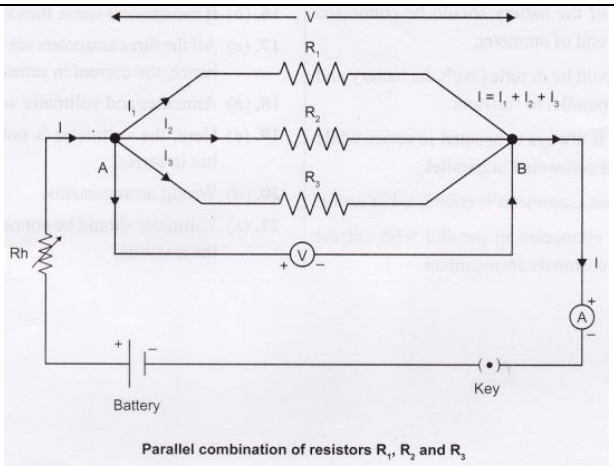
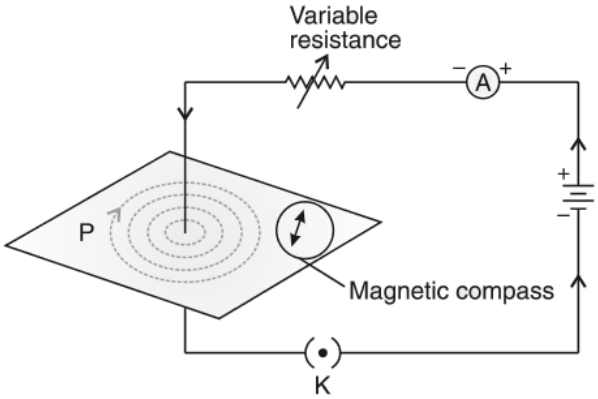
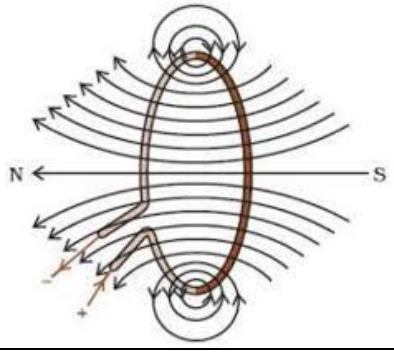
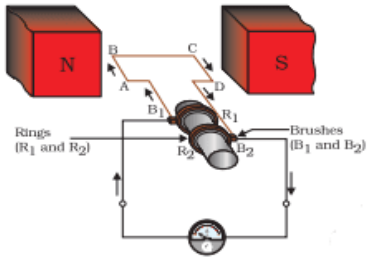
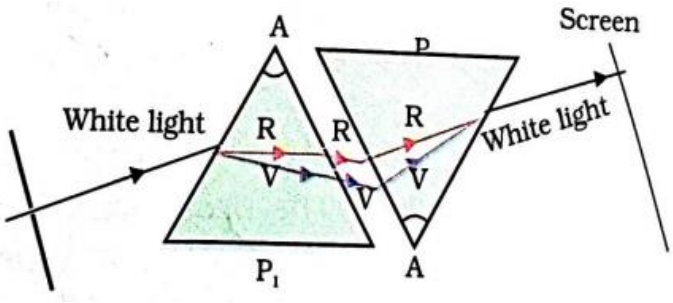
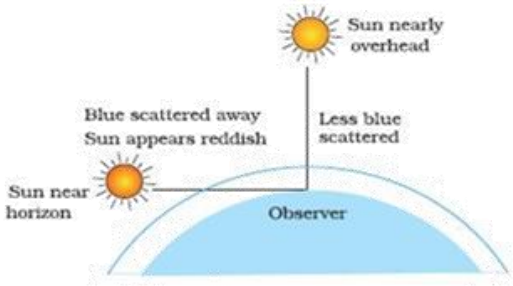
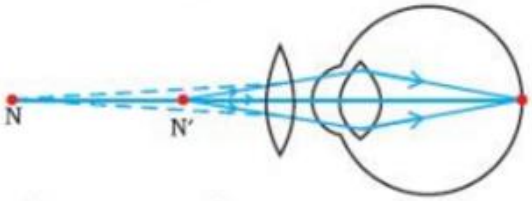
	SECTION - B	
22	(i) Concave Mirror. (ii) Between the pole and focus. (iii)  	1 + 1 + 1
23	 Parallel combination of resistors R_1, R_2 and R_3 Derivation for parallel combination of resistors:	1 + 2

	Let, V be the potential difference across the two common points A and B. Then, from Ohm's law Current passing through R_1, $I_1 = V/R_1$ ...(i) Current passing through R_2, $I_2 = V/R_2$ ...(ii) Current passing through R_3, $I_3 = V/R_3$ ...(iii) If R is the equivalent resistance, then from Ohm's law, the total current flowing through the circuit is given by, $I = V/R$ ...(iv) and $I = I_1 + I_2 + I_3$ ...(v) Substituting the values of I, I_1, I_2 and I_3 in Equation (v), $\frac{V}{R} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$ = ...(vi) Cancelling common V term, one gets $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ The equivalent resistance of a parallel combination of resistance is less than each of all the individual resistances.	
24	(a)  **(b)** Right hand thumb rule: If a current carrying conductor is imagined to be held in **right hand** such that **thumb** points in direction of current, then curled fingers of **hand** indicate the direction of magnetic field. If current flows in upward direction then direction will be anticlockwise. (c) Decreases (OR) (a)  	2 + 1

	(b) Mark the directions of electric current and magnetic field lines in the loop. (c) (i) Magnetic field strength becomes double, if Radius of the loop is reduced to half its original value, (ii) Magnetic field strength becomes double, if Strength of current through the loop is doubled.	
	SECTION- C	
29	Principle: It works on the principle of electromagnetic induction. Whenever there is a change in the flux through any coil, there would be the induction of current.  Working: An electric generator, as shown is consists of a rotating rectangular coil ABCD placed between the poles of a permanent magnet. The two ends of this coil are connected to the two rings R1 and R2. The inner side of the ring is made insulated. The two conducting stationary brushes B1 and B2 are kept pressed separately on the rings R1 and R2, respectively. The two rings R1 and R2 are internally attached to an axle. The axle may be mechanically rotated from outside to rotate the coil inside the magnetic field. Outer ends of the two brushes are connected to the galvanometer to show the direction of flow of current in the external circuit. When the axle attached to the two rings is rotated such that the arm AB moves up (and the arm CD moves down) in the magnetic field produced by the permanent magnet. Let us say the coil ABCD is rotated clockwise in the arrangement shown. By applying Fleming's right-hand rule, the induced currents are set up in these arms along the directions AB and CD. Thus an induced current flows in the direction ABCD. This means that the current in the external circuit flows from B2 to B1. After half a rotation, arm CD starts moving up and AB moving down. As a result, the directions of the induced currents in both the arms change, giving rise to the net induced current in the direction DCBA. The current in the external circuit now flows from B1 to B2. Thus after every half rotation the polarity of the current in the respective arms changes. Such a current, which changes direction periodically, is called	1 + 3 + 1

	alternating current (AC). This device is called an AC generator. The function of Brushes: Brushes helps in transferring the current from inside the generator to the external circuit.	
30	(a) The cause of dispersion is the change in speed of light with wavelength. When white light enters the first surface of a Prism, light of different colours due to their different speeds in glasses gets deviated towards the base of the prism through different angles that is the Dispersion of white light into its constituent colours takes place at the first surface of prism. (b)  (c)  Sun is near the horizon and its rays cover a larger part of the atmosphere at sunrise and sunset. The intensity of the scattered light is inversely proportional to the wavelength of the colour. So, most of the blue light and components of shorter wavelength are scattered away by the particles of the atmosphere. The component of red light is least scattered because it has the longest wavelength and is visible to us. Hence, the sun looks red at the time of sunrise and sunset. (OR) When light rays entering the eye focus behind the retina, rather than directly on it. The eyeball of a farsighted person is shorter than normal. Many children are born farsighted, and some of them "outgrow" it as the eyeball lengthens with normal growth.	1 + 2 + 2



(c) Correction for Hypermetropic eye

(b) Causes of hypermetropia---It is caused by the failure of the lens to return to its normal rounded shape, or. by the eyeball being too short, with the result that the image is focused on a point behind the retina.

(c) U=-25cm

V= - 1m= - 100cm

1/f=1/v-1/u

1/f = - 1/100-1/-25

=-1/100+1/25

= - 1+4/100

= - $3/100cm^{-1}$

Power: p=1/f

= 3/100 x 100D

P= 3D

The convex lens required to correct hypermetric.

End of the Question Paper