

# Comprehensive PHYSICS–XII

## Value Based Questions

### CHAPTER 1

1. John was very fond of small children. After coming back from office, he used to collect children of his locality and play with them. One day John thought that entertainment and education should go together. He thought of an interesting science experiment. He combed his dry hair with a plastic comb. The comb could now attract small pieces of paper. The children were very surprised at this. They asked John to explain the ability of the comb to attract pieces of paper. John explained that there is no magic in this. John explained the concept of frictional electricity. The children were very happy to receive the scientific knowledge.

(a) What according to you, are the values displayed by John ?

(b) Write a note on frictional electricity.



### CHAPTER 3

2. Krishna enjoys microwave cooking. One day she was wondering how the microwave oven works. She wanted to know the scientific aspect of this type of cooking. She talked to her elder sister who is working as scientific officer in Bhabha Atomic Research Centre. Her sister explained the scientific aspect of microwave cooking. Krishna was very happy to get the information. She decided to share this knowledge with her friends.

(a) What according to you, are the values displayed by Krishna ?

(b) Write a brief note on the science of microwave cooking.

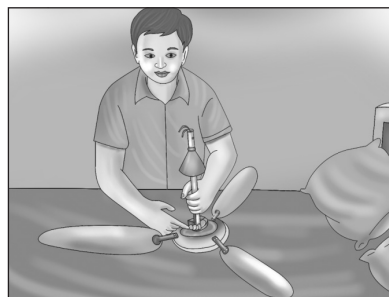


### CHAPTER 4

3. Munish did not have any practical training of electricity repair but he always tries to carry out electricity repair with great enthusiasm. One day the ceiling fan was not working. Munish immediately declared that the condenser used in the fan has a problem. So he decided to check the condenser but his elder brother Neeraj stopped him from touching the condenser. Neeraj told him to wait for at least one hour after the fan is switched off. Munish argued that the fan is not working and therefore switching off the fan has no meaning. Neeraj insisted that he would not touch the condenser immediately after switching off the fan. Munish reluctantly agreed.

(a) What according to you are, the values displayed by Neeraj ?

(b) Why Neeraj stopped Munish from touching the condenser ?



4. Maya is very fond of watching TV. She does not view any single channel for a long time. She has the habit of shifting from one channel to another. One day she wondered as to what makes it possible to shift from one channel to another. She asked her father who knew nothing about this. He talked to his friends but nobody knew anything about the technical aspects of TV. Finally Maya's father went to a TV repair shop. The technician showed him a TV tuner and told him that the shifting of channels is possible because of this device. Maya's father borrowed TV tuner from the technician to show it to his daughter. Maya was very happy and thanked her father for all the trouble he took.

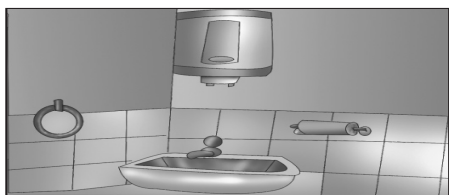
- (a) What according to you, are the values displayed by Maya's father ?  
 (b) How does a TV tuner help in the shifting of channels ?



## CHAPTER 5

5. Subhashini often thought as to why the water in the electric geyser does not get heated beyond a particular temperature even when current is passing continuously through the geyser. She shared this with her elder daughter Neelam. Neelam did not have any idea about this. She talked to her friends but could not find any satisfactory answer. Finally, she went to an electricity repair shop. The technician told Neelam about a device called thermistor used in the geyser. Neelam told her mother who was happy at the information.

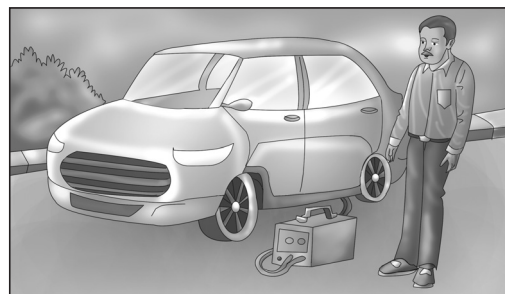
- (a) What according to you, are the values displayed by Neelam ?  
 (b) What are the uses of thermistors ?



## CHAPTER 6

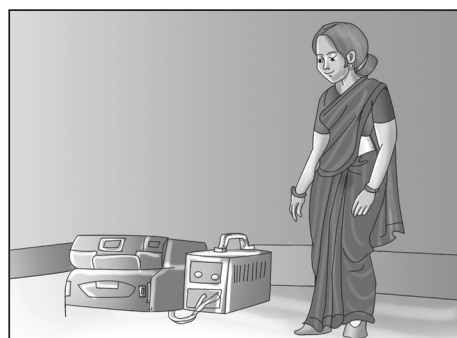
6. Munish had gone, out of station, on a vacation for one week. After coming back, he tried to start his car but failed. He realised that he needs to charge the battery of his car. He went to the workshop to hire a battery charger. Munish connected the black lead of the battery charger to the positive terminal of the car battery and the red lead to the negative terminal of the car battery. The car battery was not charged. Munish thought over it and decided to reverse the leads. Now, he was successful in charging the car battery.

- (a) What according to you, are the values displayed by Munish ?  
 (b) How should a battery charger be connected to a car battery ?



7. Agnes was fed-up with less back-up and low voltage of her inverter and battery set. During the last three years, it never caused any problem. Agnes decided to tackle this problem. She talked to many of her friends who almost unanimously advised her to change the battery. One of her friends suggested to put distilled water in the battery. Agnes put distilled water in the battery but the problem was only temporarily solved. Agnes finally decided to change the battery.

- (a) What according to you, are the values displayed by Agnes ?  
 (b) Is it necessary to change battery after a few years ?



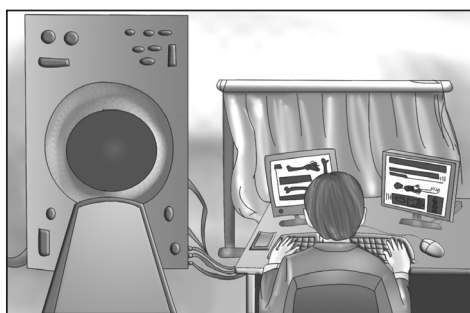
## CHAPTER 8

8. Suhasini's uncle, was advised by his doctor to have an MRI scan of his chest. Her uncle did not know much about the details and significance of this test. He also felt that it was too expensive and thought of postponing it.

When suhasini learnt about her uncle's problems, she immediately decided to do something about it. She took the help of her family, friends and neighbours and arranged for the cost of the test. She also told her uncle that an MRI (Magnetic Resonance Imaging) scan of his chest would enable the doctors to know of the condition of his heart and lungs without causing any (test related) harm to him. This test was expensive because of its set up that needed strong magnetic fields (0.5T to 3T) and pulses of radio wave energy. Her uncle was convinced and had the required MRI scan of his chest done. The resulting information greatly helped his doctors to treat him well.

- (a) *What according to you, are the values displayed by Suhasini and her family, friends and neighbours to help her uncle ?*
- (b) *Assuming that the MRI scan of her uncle's chest was done by using a magnetic field of 1.0 T, find the maximum and minimum values of force that this magnetic field could exert on a proton (charge =  $1.6 \times 10^{-19}$  C) that was moving with a speed of  $10^4$  ms<sup>-1</sup>. State the condition under which the force has its minimum value.*

[CBSE Sample Paper 2013]



## CHAPTER 9

9. A door-to-door salesman was convincing Mrs Tyagi about the benefits of magnetotherapy. He had different types of magnets as a cure for different diseases. He had tablets for use in drinking water,

a bracelet for controlling blood pressure, magnetic soles for feet and pain-relieving pads, Mrs Tyagi was trying to strike the best possible bargain. In the meantime, Mrs Tyagi's son Appoorva came home. He was surprised at the seriousness with which his mother was trying to purchase. He asked his mother to wait for some time. Appoorva talked to some of his friends on the phone and concluded that magnetotherapy does not have a sound scientific base. Appoorva told his mother that purchasing these things is a sheer waste of money. Mrs Tyagi agreed and thanked Appoorva.

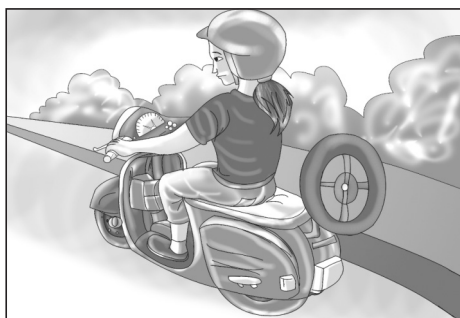
- (a) *What according to you, are the values displayed by Appoorva ?*
- (b) *What is the role of magnetotherapy in the treatment of diseases ?*



## CHAPTER 10

10. Charu's father got her a new scooter. She was very happy to drive the scooter. One day she observed that there is a speedometer, in the scooter, which gives the instantaneous speed of the scooter. Charu asked her father as to how the speedometer is able to measure the speed. Her father knew nothing about the mechanism of measurement of speed. He went to the scooter agency to understand the same. The manager of the agency called a scooter mechanic who explained the working of speedometer. Charu's father came home and explained everything to her. Charu thanked her father for taking interest in her curiosity.

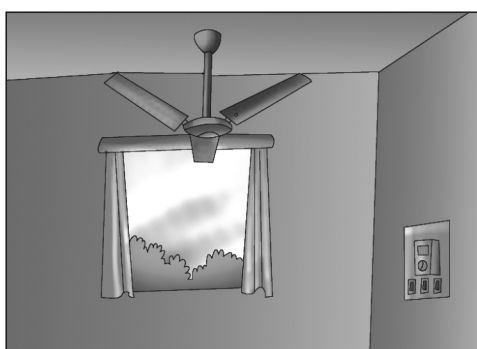
- (a) *What according to you, are the values displayed by Charu's father ?*
- (b) *Explain the working of speedometer.*



## CHAPTER 11

11. Neeraj went to the market to buy a speed regulator for his fan. The shopkeeper showed a number of speed regulators whose cost varied considerably. Neeraj was confused. He came back. He consulted a number of his friends and also searched on the internet the information about speed regulators. He finally came to know that the resistive speed regulators were cheaper than inductive speed regulators. However, the running cost of resistive speed regulators was more than the running cost of inductive speed regulators. Neeraj decided to buy an inductive speed regulator inspite of its being expensive. He had inward satisfaction that he is going to make the best buy.

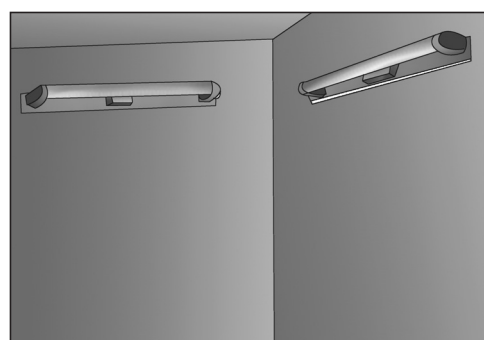
- (a) *What according to you, are the values displayed by Neeraj ?*  
 (b) *Why inductive speed regulator is better than resistive speed regulator ?*



12. Nirmal Singh was fed up with paying heavy electricity bills. He casually shared his concern with his son Parduman who was a class XII student. Parduman made use of the internet facility in his school. He started his search to reduce electricity bill. After much effort, Parduman came across an idea to replace electric bulbs in his house by electric tube lights. He told his father

about this. However Nirmal Singh was not very happy with the idea as he would have to spend a good deal of money to purchase the electric tube lights. At the same time, the electric bulbs would be a waste. Somehow, Parduman convinced his father to implement his scheme. Nirmal Singh reluctantly agreed but had a pleasant surprise when he received the next electricity bill.

- (a) *What according to you, are the values displayed by Parduman ?*  
 (b) *Show that choke coil is more efficient than ohmic resistance in controlling alternating current.*

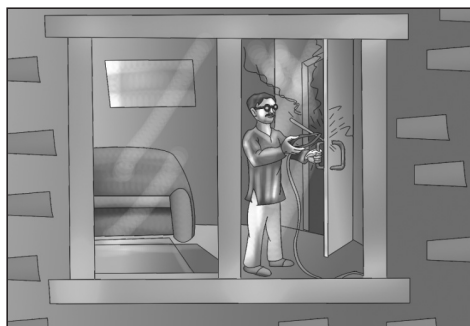


## CHAPTER 12

13. The residents of the locality of Rajiv Nagar were fed up with the strong fluctuations in electric supply. They were surprised with these fluctuations because the distribution transformer supplying electricity to the locality appeared to be in good condition. The supply comprised of three phases and one neutral. The residents made many complaints to the supplier but the problem persisted. Parkash Singh, a resident of Rajiv Nagar locality, decided to go deep into the matter. He called a meeting of the residents of the locality. During the discussion, one resident pointed out that his neighbour Raghav has installed a welding set in his premises. Parkash Singh, accompanied by a few residents, went to Raghav's house and requested him to move the welding set out of the locality. Raghav expressed his reservations on this. Finally, a deal was struck with him that he would operate his welding set only during the least disturbing hours. Raghav happily agreed. Residents thanked Parkash Singh for the initiative that he has taken.

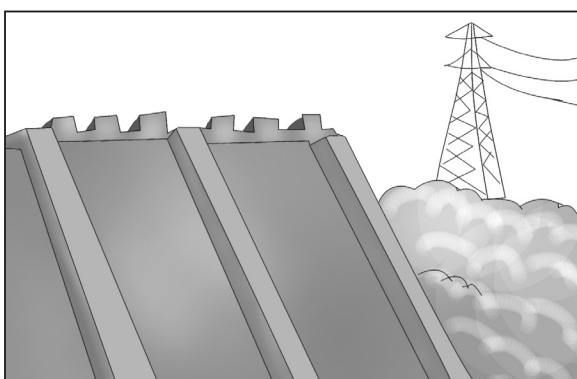
- (a) *What according to you, are the values displayed by Parkash Singh ?*

(b) How the operation of welding set produces fluctuations in electricity supply ?



14. Maya was often surprised as to how she gets electricity in her home when the electricity is being produced in a hilly region which is four hundred miles away from her home. One day Maya talked to her elder brother Raj who is an accountant by profession. Raj was surprised as to why he never thought of it. However, Raj talked to his friend who is an electrical engineer. He explained to Raj the use of transformers in long distance transmission of electrical energy. Raj explained to his younger sister Maya who thanked Raj for the valuable information.

(a) What according to you, are the values displayed by Raj ?  
 (b) Discuss long distance transmission of electrical energy.



### CHAPTER 14

15. Maya was surprised to observe that light from a street lamp diverges over a large area. She asked her elder brother Raj about this. Raj himself was surprised at this observation of Maya. Raj talked to senior students in his school and also consulted a science teacher. After having understood properly, he explained to his younger sister Maya

that a mirror is used as a reflector in street lamp. It is due to this mirror that the light from the lamp diverges over a large area. Maya was satisfied and she thanked her elder brother.

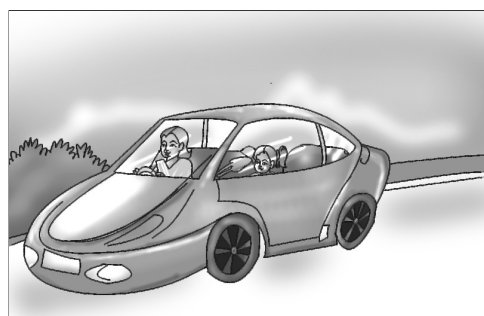
(a) What according to you, are the values displayed by Raj ?  
 (b) Which mirror is used as a reflector in street lamp ?



### CHAPTER 15

16. Anju and her mother were travelling in a car, on a hot summer day, in Rajasthan. Anju observed a pool of water, on the road, at a large distance from the car. She told her mother who was astonished to see the pool of water. But even after travelling a large distance, they did not find any water. Both Anju and her mother were very surprised about this phenomenon. They could not understand anything about this phenomenon. Anju's mother talked to many people in her social circle and finally came to know that this phenomenon is called "mirage". Anju was very happy to get this information and thanked her mother.

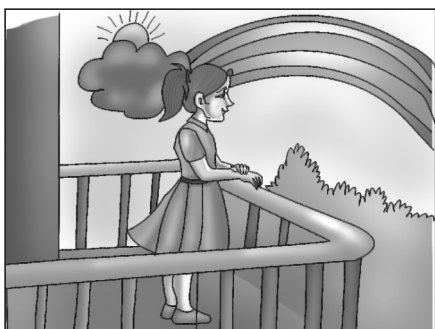
(a) What according to you, are the values displayed by Anju's mother ?  
 (b) Which phenomenon of physics is involved in mirage ?



**CHAPTER 16**

17. Trishla was standing in the balcony of her house in Shimla. She was enjoying the natural scenery. The rain had just stopped falling. The sky was clear. There were clouds in the east and there was bright sunshine. The Sun was at the back of Trishla. A rainbow appeared in the sky. It was very beautiful. Trishla started thinking about the origin of rainbow. She could not arrive at any conclusion. She asked her mother about this. Her mother taught biology in a school. Her mother consulted the physics teacher in her school and understood the origin of rainbow. Trishla's mother came home and explained the origin of rainbow to Trishla. Trishla was overjoyed and thanked her mother.

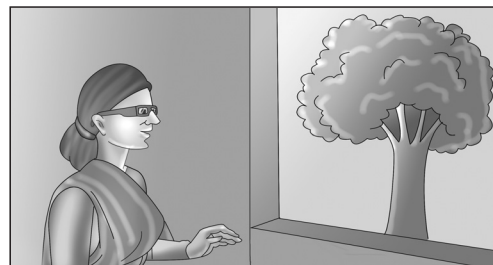
- (a) What according to you, are the values displayed by Trishla's mother ?  
 (b) Which concept of physics is involved in the formation of rainbow ?

**CHAPTER 17**

18. Maya's grandmother could not see distant objects clearly. She consulted her friends who suggested that she should eat lot of tomatoes and carrots. A stage came when Maya's grandmother was fed up eating tomatoes and carrots but she still could not see distant objects clearly. When Maya came to know of the problem, she prevailed upon her grandmother to accompany her to a doctor. Maya's grandmother reluctantly agreed. Doctor diagnosed that Maya's grandmother is suffering from myopic vision and she needs glasses. Maya went to the optician and ordered spectacles for her grandmother. When grandmother wore spectacles, she was overjoyed because she could see distant objects clearly. She gave her blessings to Maya.

- (a) What according to you, are the values displayed by Maya?

- (b) Which lens has been used in the spectacles of Maya's grandmother?

**CHAPTER 18**

19. Neha was watching her mother who was washing clothes. Coloured soap bubbles excited Neha. She asked her mother as to why the soap bubbles appear coloured. Her mother did not know anything about this. In the evening, she talked with Neha's father. He also did not know anything. Both father and mother went to a science teacher who lived nearby. The teacher explained everything to Neha's parents. They were satisfied. They came home and explained everything to Neha. Neha was very happy and she expressed her gratitude to her parents.

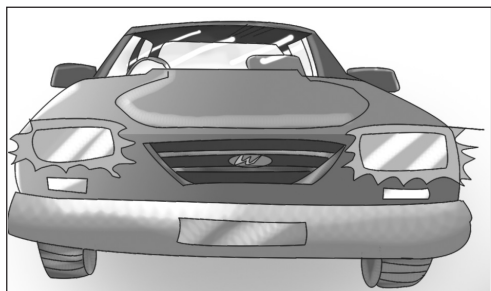
- (a) What according to you, are the values displayed by Neha's parents ?  
 (b) Which concept of physics is involved in the formation of colours in soap bubbles ?

**CHAPTER 19**

20. Shakeel Ahmed often thought as to how the glare is reduced in headlights of automobiles. He once talked to his maternal uncle Nadeem about this. Nadeem himself did not know anything about this. Nadeem went to a library and consulted many books. He could finally understand things. When he explained to Shakeel Ahmed the details,

Shakeel Ahmed was very happy. Shakeel thanked his uncle Nadeem.

- (a) *What according to you, are the values displayed by Nadeem ?*
- (b) *How glare is reduced in headlights of automobiles ?*



21. Simran accompanied her mother to an optician to buy sunglasses. The shopkeeper showed them a vast variety of sunglasses. The price varied from a few hundred to few thousand. The shopkeeper could not satisfactorily explain the vast difference in the prices of various sunglasses. Simran's mother postponed the decision to buy sunglasses. Before buying sunglasses, Simran's mother wanted to be sure that she gets the best for Simran. She went to different shops, talked to many people and finally bought polaroid sunglasses for Simran. Simran was very happy and she thanked her mother for the best buy.

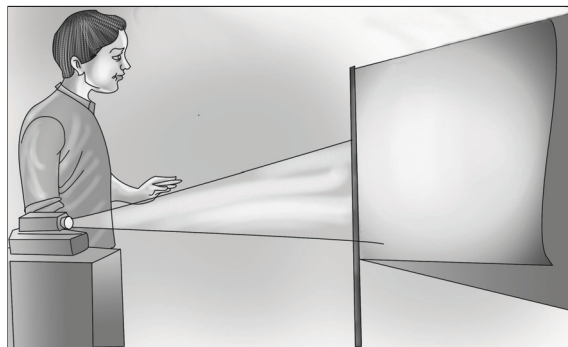


- (a) *What according to you, are the values displayed by Simran's mother ?*
- (b) *What is special about polaroid sunglasses ?*

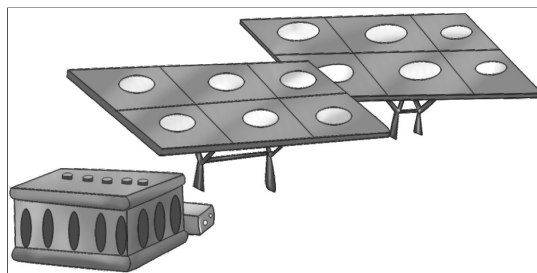
## CHAPTER 20

22. Mintoo was often surprised by the reproduction of sound in cinema films. He asked his maternal uncle about this. The maternal uncle did not know anything about this but he made up his mind to find out the details of reproduction of sound in cinema films. He became friendly with the operator of the projector of the cinema hall and understood everything. Then he took Mintoo to the projector room. The operator explained everything to Mintoo. Mintoo was overjoyed to see everything. He thanked his uncle.

- (a) *What according to you, are the values displayed by Mintoo's uncle ?*
- (b) *What is the role of photoelectric effect in the reproduction of sound in cinema film ?*



23. Rinku could not understand the working of a solar battery. He remained surprised as to how solar radiations produce electrical voltage. He asked his mother to explain to him the working of solar battery. His mother made lot of efforts to understand the working of solar battery. She finally succeeded and explained to Rinku the working of solar battery. Rinku was overjoyed to understand the conversion of solar radiation into electrical voltage and thanked his mother.



(a) What according to you, are the values displayed by Rinku's mother ?

(b) Which cells are used in converting solar radiations to electrical voltage ?

24. Nadeem was watching a movie in which he saw the automatic opening of garage door when car came in front of it. He was totally surprised and fascinated. He asked his uncle about this. His uncle did not know anything about this. However, his uncle made up his mind to find out the details. After talking to many people, Nadeem's uncle came to know that the phenomenon of photoelectric effect is involved in the automatic opening of the garage door. He explained to Nadeem. Nadeem was very happy and thanked his uncle.

(a) What according to you, are the values displayed by Nadeem's uncle ?

(b) How photoelectric effect is involved in the automatic opening of the garage door ?



## CHAPTER 21

26. Rinku, a class XI student of medical stream, was curious to know about viruses and structural details of bacteria. He frequently asked his teacher about these things. Then one day, Rinku's teacher decided to take a group tour of medical students to Bombay. On reaching Bombay, Rinku's teacher took his students to an advanced science laboratory where the students could study the structural details of bacteria. Rinku was very happy and thanked his teacher.

(a) What according to you, are the values displayed by Rinku's teacher ?

(b) Which concept of Physics is used in the design of electron microscope ?

## CHAPTER 23

27. Mohini's mother was gaining weight and her body was becoming bulky. She was also experiencing more than normal "hunger". Mohini was worried about this. She talked to her friends who suggested her to take her mother to a doctor. Mohini's mother was not willing to go to doctor. Mohini told her friends about this. One day Mohini's friends came to Mohini's home and persuaded her mother to go to doctor. Doctor administered a radioisotope of iodine and diagnosed the problem. Mohini's mother was prescribed appropriate medicines.

(a) What according to you, are the values displayed by Mohini and her friends ?

(b) Give some information about the radioisotope of iodine.



25. Sonia often thought as to how a piece of paper has uniform thickness. A question often cropped up in her mind as to how the thickness of paper is controlled. She asked her elder sister Priya about this. Priya was surprised at the question. This question never crossed her mind earlier. She immediately switched on her computer and internet services. Priya found out that the phenomenon of photoelectric effect is involved in this. She told Sonia about this. Sonia was very happy. She thanked her sister Priya for taking so much interest in her question.

(a) What according to you, are the values displayed by Priya ?

(b) How is thickness of paper controlled by the use of photoelectric effect ?





28. Maya observed that the sensory activities of her sister Meenu have reduced. She further observed that there is a change in Meenu's gait. Moreover, sometimes Meenu started stammering. Maya requested her sister to accompany her to a doctor. But Meenu was reluctant. So, Maya herself went to see the doctor and apprised him of the symptoms of her sister. Doctor advised Maya to bring her sister immediately. Maya came home very agitated and forced Meenu to accompany her to the doctor. Doctor thoroughly examined Meenu and diagnosed that Meenu has a brain tumour.

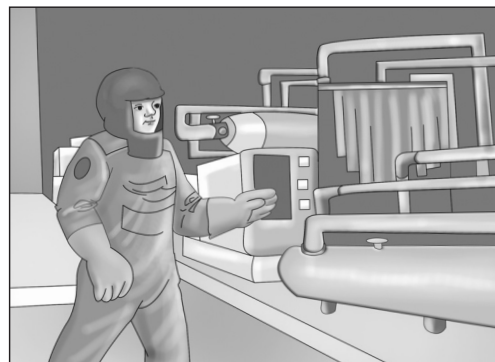
- (a) *What according to you, are the values displayed by Maya ?*  
 (b) *How radioisotopes help a doctor to diagnose brain tumour ?*



29. Jasbir Kaur was watching a movie in which workers in a nuclear reactor were shown to be wearing a micro-film badge. She enquired about this from her elder brother Satnam Singh who was working in a cycle factory. He did not know anything about the micro-film badge. He made many enquiries from different people and finally came to know that micro-film badges are worn by workers working in an area where there is radiation hazard. He told his sister Jasbir Kaur

about this. Jasbir Kaur was happy to know the reason of wearing micro-film badge. She was all the more happy with her brother for taking a lot of interest in answering her query.

- (a) *What according to you, are the values displayed by Satnam Singh ?*  
 (b) *Give some information about the utility of micro-badge.*



## CHAPTER 24

30. Ratnesh was fond of music. He enjoyed loud music but his stereo system was not producing very loud music. It was a great disappointment for Ratnesh. He discussed his problem with his friends Tejas and Jasleen. Tejas and Jasleen promised Ratnesh that they will do something about this problem. Tejas and Jasleen went to many music system shops and finally came up with a solution. They got an amplifier connected in series with the amplifier of Ratnesh's stereo system. This increased considerably the loudness of music and Ratnesh was satisfied. Ratnesh was very happy and thanked his friends.

- (a) *What according to you, are the values displayed by Tejas and Jasleen ?*  
 (b) *How the loudness of sound increased on connecting another amplifier ?*



31. Tanya often marvelled at the functioning of the remote control of her television set. One day she told her husband about it. Her husband made up his mind to understand the working of the remote control and explain the same to Tanya. He found out one shop where remote controls were repaired. The shopkeeper showed to Tanya's husband the inside of the remote control and explained to him the working of the remote control. When Tanya's husband explained to Tanya the working of the remote control, Tanya was very happy and satisfied. She thanked her husband for making so much effort.

- (a) *What according to you, are the values displayed by Tanya's husband ?*  
 (b) *Name the special purpose diode used in remote control.*



32. One Sunday morning, Neeraj's father was to go to Petrol Station for filling his car tank. He took Neeraj with him. At the Petrol Station, Neeraj was surprised to see "electronic numbers" that glow. He asked his father about this. His father did not know anything about this technology. Neeraj's father now thought of similar "electronic numbers" in cash registers, microwave ovens and alarm clocks. Neeraj's father worked hard to acquire knowledge of this technology and finally satisfied Neeraj. Neeraj is now proud of the fact that he understands the technology of "electronic numbers".

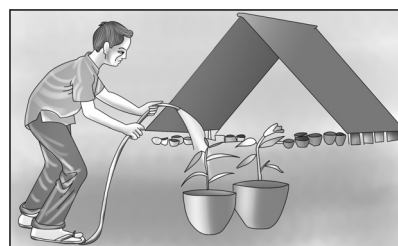
- (a) *What according to you, are the values displayed by neeraj's father ?*  
 (b) *Name one device which is used in "electronic numbers".*



## CHAPTER 25

33. A gardener desperately wanted an alarm to sound when the air temperature in his greenhouse fell below  $0^{\circ}\text{C}$  or rose above  $30^{\circ}\text{C}$ . He consulted his son Raj who is an electronics engineer. Raj took this problem very seriously and tried to solve it whole-heartedly. Raj was finally successful in designing a cheap digital circuit which solved his father's problem. The gardener was very happy and appreciated his son. The gardener was proud of his son.

- (a) *What according to you, are the values displayed by Raj ?*  
 (b) *Which logic gate has been possibly used by Raj in designing the digital circuit for his father ?*



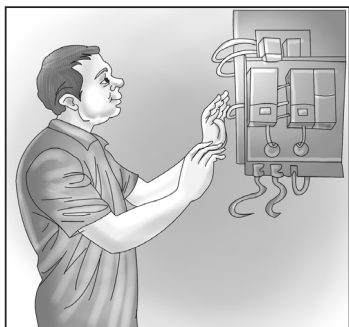
34. Maya's grandmother had a box full of jewellery. She was always worried about the possible theft of this box. She shared her worry with Maya. Maya consulted her friends and finally bought a burglar alarm for her grandmother. When Maya gave demonstration of Burglar's alarm to her grandmother, the grandmother's joy knew no bounds. The grandmother was now a very much relaxed person and gave her blessings to Maya.

- (a) *What according to you, are the values displayed by Maya and her friends ?*  
 (b) *Which logic gate is the basis of Burglar's alarm ?*



35. Nadeem's father was very fond of making electrical circuits which can perform different functions. These electrical circuits were made from transistors, diodes, resistors, capacitors etc. Nadeem was not happy with the size and cost of these circuits. He started consulting his friends about this problem and came up with the brilliant idea of using cheap integrated circuits. Nadeem's father was very happy to know of Nadeem's idea and decided to translate it into reality. Nadeem's father was successful in reducing both the size and cost of the circuits. Nadeem's father praised Nadeem for taking so much interest and gifted him a wrist watch.

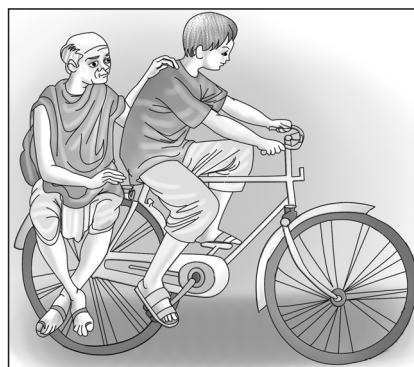
- (a) What according to you, are the values displayed by Nadeem ?  
 (b) What is an integrated circuit ? What are the uses of integrated circuits ?



## CHAPTER 26

36. Raj was cycling from his village to a neighbouring village. On the way, he met an old man who was walking in the direction of the same neighbouring village. Raj invited the old man to sit on his cycle and took him to the neighbouring village. The old man got down from the cycle, thanked Raj and gave his blessings.

- (a) What according to you, are the values displayed by Raj ?  
 (b) Can you relate the given paragraph with the process of modulation ?



37. Though Parminder, a 12 years old boy, was playing with a ball yet the boredom was reflected on his face. He was unhappy as nobody was there to play with him. His elder brother Manjinder was observing Parminder. Manjinder invited Parminder to throw the ball towards him. Manjinder asked Parminder to roll the ball on the ground towards him or to throw the ball towards him in the air or to hit the ball towards the ceiling of the room and direct it towards him. Now, Parminder was thoroughly enjoying the game.

- (a) What according to you, are the values displayed by Manjinder ?  
 (b) Can you relate the paragraph with some concept of communication system ?



38. Saurabh's grandfather was talking to him about the quality of music from transistorised radio set. He was complaining that in earlier times, there was noise in the music which acted as an irritant. However now-a-days, the noise is almost missing from the music. Saurabh explained to him that the absence of noise is not due to the quality of the radio set but due to the superior technology used in the transmission of signal. Saurabh's grandfather was happy to have this information.
- (a) What according to you, are the values displayed by Saurabh ?

(b) Which superior technology is being talked about by Saurabh ?



39. Dikshit presented a mobile set to her mother on her birthday. She could now conveniently talk to her sister in USA and her nephew in Australia. She was happy and blessed her son. Dikshit told her mother that she can now have heart to heart talk with anybody in any corner of the world at very nominal cost. Dikshit's mother was also interested in knowing that how it is possible to

receive BBC and CNN programmes live on her TV set. Dikshit told her mother that the global communication network is due to communication satellites. Dikshit's mother thanked Dikshit for this valuable information.

- (a) What according to you, are the values displayed by Dikshit ?  
 (b) What is the minimum number of communication satellites required for global communication coverage ?



### Hints/Answers

#### ● Chapter 1 ●

1. (a) John is fond of children. John is full of positive energy. John has a scientific temperament. John has the art of combining education with entertainment.  
 (b) See Text.

#### ● Chapter 3 ●

2. (a) Krishna is fond of cooking. She shows a keen interest in the scientific aspect of cooking. She is a very social person. She loves to share her knowledge with her friends.  
 (b) See Text.

#### ● Chapter 4 ●

3. (a) Neeraj showed care for his brother. Neeraj adopts a safe and cautious approach in life.  
 (b) The capacitor of the fan gets charged when the fan is switched on. The capacitor remains electrified for some time even after the fan is switched off.
4. (a) Maya's father understands his responsibilities as a father. He has lot of determination and investigative skills. The fact that he brought home the TV tuner shows his thorough approach in life.

- (b) TV tuner is basically a variable capacitor. By varying capacity, we can get a variety of tuned circuits *i.e.*, different channels.

#### ● Chapter 5 ●

5. (a) Neelam is a girl of great determination. She is a very confident girl. She has good communication skills. Moreover, she cares for her mother's feelings.  
 (b) See Text.

#### ● Chapter 6 ●

6. (a) Munish is a very active and smart person. He has a scientific temperament. He is not easily discouraged. He applies his mind to solve a problem.  
 (b) The positive and negative of the battery charger should be connected to the positive and negative respectively of the battery to be charged.
7. (a) Agnes has a fighting spirit. She does not give up easily. She likes to share her problems with her friends.  
 (b) Yes. Battery has a limited life.

### ● Chapter 8 ●

8. (a) (i) Presence of mind, High degree of general awareness, Ability to take prompt decisions and concern for her uncle. (ii) Empathy, helping and caring nature.  
 (b) Maximum force =  $Bqv$   
 $= 1 \times 1.6 \times 10^{-19} \times 10^4 \text{ N}$   
 $= 1.6 \times 10^{-15} \text{ N}$   
 Minimum force = zero  
 Condition: When  $\vec{V}$  is parallel to  $\vec{B}$ .

### ● Chapter 9 ●

9. (a) Appoorva is an intelligent boy. So, the salesman could not be fool him easily. He has investigative skills and a good convincing power.  
 (b) The role of magnetotherapy in the fast cure of serious diseases is not recognised in the medical science.

### ● Chapter 10 ●

10. (a) The gift of a scooter to Charu speaks of fatherly love and affection. Going all the way to a scooter agency shows the efforts of Charu's father.  
 (b) See Text.

### ● Chapter 11 ●

11. (a) Neeraj is an intelligent shopper. He has the quality of going into the minute details of everything. Neeraj has the quality of making use of modern technology.  
 (b) No power is consumed by an inductance in one cycle of alternating current. So, running cost of an inductive speed regulator is less than the running cost of resistive speed regulator.  
 12. (a) Parduman has the quality of making use of modern technology. He is a very confident young man with a good convincing power.  
 (b) See Text.

### ● Chapter 12 ●

13. (a) Parkash Singh has leadership quality. He showed great organisational and communication skills. Moreover, he has convincing power.

(b) At the time of welding, the load increases and produces fluctuations in power supply.

14. (a) Raj understands his duties as a brother. He made efforts to address his younger sister's curiosity. He also showed confidence in finding out the details.  
 (b) See Text.

### ● Chapter 14 ●

15. (a) Raj has a helping attitude towards his sister. Raj is a knowledge-seeker.  
 (b) Convex mirror.

### ● Chapter 15 ●

16. (a) Anju's mother respected her daughter's inquisitiveness and showed responsibility towards fulfilling her curiosity. She also showed determination to solve a puzzle.  
 (b) Total internal reflection.

### ● Chapter 16 ●

17. (a) Trishla's mother showed concern for her daughter's curiosity. She did not hesitate to consult her colleague.  
 (b) Total internal reflection.

### ● Chapter 17 ●

18. (a) Maya showed care, love and concern for her grandmother. Maya also showed determination.  
 (b) Concave lens.

### ● Chapter 18 ●

19. (a) Neha's parents showed responsibility towards their daughter. They showed initiative in solving the problem.  
 (b) Interference.

### ● Chapter 19 ●

20. (a) Nadeem loves his nephew and is ready to 'run the extra mile' for his nephew. Nadeem also showed strong will to find out the details.  
 (b) Polaroids are used in headlights of automobiles to reduce glare.  
 21. (a) Simran's mother showed investigative skills. She also showed 'perfectionist' attitude. She is a hard-working woman. She is very careful in taking decisions.

- (b) Polaroid sunglasses drastically reduce unwanted glare.

### ● Chapter 20 ●

22. (a) Mintoo's uncle showed love for Mintoo. He also displayed qualities of patience and determination.  
(b) See Text.
23. (a) Rinku's mother is a good mother. She shows responsibility. She has determination.  
(b) Photo-voltaic cells.
24. (a) Nadeem's uncle showed qualities of love, patience and determination.  
(b) See Text.
25. (a) Priya has the ability to make use of modern technology. Priya displays responsibility towards her sister.  
(b) See Text.

### ● Chapter 21 ●

26. (a) Rinku's teacher showed concern for the curiosity of his students. He took a bold initiative to satisfy his students.  
(b) Electron microscope is a practical application of de Broglie waves.

### ● Chapter 23 ●

27. (a) Mohini is a good daughter. She showed concern for her mother's health. Mohini's friends took special interest in Mohini's problem. So, they have shown a sense of responsibility in friendship.  
(b) When iodine is taken in by a human body, it is more strongly absorbed by the thyroid gland. The radioisotope of iodine  $^{131}_{53}\text{I}$  has a half-life period of 8 days and it decays by emitting  $\beta$  (fast electrons) particles. Thus, radioiodine is administered orally to a patient and its concentration in the thyroid gland measured by means of sensitive  $\beta$  detectors. Thus, we can diagnose whether the gland is functioning normally, or is underactive or is overactive.
28. (a) Maya is a keen observer. She is quick to take decisions. She shows concern for her sister.  
(b) It is not easy to diagnose brain tumours. Certain radioisotopes are injected in the body. In course of time, these reach the tumour of the brain where these are absorbed. From the intensity of the radiation emitted by them, we

can locate the position, extent and the severity of the tumour in the brain.

29. (a) Satnam Singh has investigative skills in knowing about different things. He is good at performing the duty of elder brother.  
(b) A small micro-film badge is always to be worn by the person working near the hazardous area. This film is affected by the radiations. It is checked periodically so that the exposure to the person concerned is noted. If it exceeds a safe limit, he is advised rest at an isolated place.

### ● Chapter 24 ●

30. (a) Tejas and Jasleen value friendship and are ready to 'run the extra mile' for their friend. Tejas and Jasleen showed determination to succeed.  
(b) When two amplifiers are connected in series, the 'amplification gains' of the two amplifiers get multiplied.
31. (a) Tanya's husband is a good husband. He takes special interest to understand the working of the mind of his wife. He makes effort to satisfy his wife's desire for knowledge.  
(b) Light-emitting diode.
32. (a) Neeraj's father tries to spend quality time with his son. He takes special interest to satisfy his son's hunger for knowledge.  
(b) Light-emitting diode.

### ● Chapter 25 ●

33. (a) Raj showed respect for his father's needs. Raj thought that it is his duty to help his father. Raj displayed skill in the practical application of his knowledge.  
(b) Raj has used OR gate in his digital circuit.
34. (a) Maya showed concern for her grandmother's worries. Maya was receptive of the suggestions given by her friends. Maya's friends had a helping attitude.  
(b) The AND gate is the basis of Burglar's alarm.
35. (a) Nadeem showed interest in his father's hobby. Nadeem displayed investigative skills in scientific knowledge.  
(b) Integrated circuit is that circuit in which the circuit components such as resistors, capacitors, diodes and transistors etc. are automatically parts of a small semiconductor chip.

The integrated circuits are widely used in making television, radio, video cassette recorders and computers.

● Chapter 26 ●

36. (a) Raj showed concern for the stranger and respect for the old age of the person.  
(b) Just as the old man sat on the cycle, the message signal is superposed on the carrier wave. The modulated carrier wave travels some distance. The message signal is then recovered from the modulated wave in the same way as the old man got down from the cycle.
37. (a) Manjinder shows concern for the state of mind of his younger brother. Manjinder aroused the interest of his younger brother by participating in the game.  
(b) The given paragraph can be related with three modes of wave propagation—ground wave propagation, space wave propagation and sky wave propagation.
38. (a) Saurabh has patience to listen to his grandfather. Saurabh tried to update his grandfather with modern day knowledge.  
(b) In earlier times, AM technology was used. So, “noise” was a problem. Now-a-days FM technology is used. So, the problem of “noise” in music is solved.
39. (a) Dikshit was thoughtful. He showed interest to find out the best mobile set and various schemes which were economical. He displayed knowledge of modern technology.  
(b) Three.