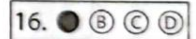


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Total Questions: 50 | Time: 1 hr.

Guidelines for the Candidate

- You will get additional ten minutes to fill up information about yourself on the OMR Sheet, before the start of the exam.
- Write your **Name, School Code, Class, Section, Roll No.** and **Mobile Number** clearly on the **OMR Sheet** and do not forget to sign it. We will share your marks / result and other information related to SOF exams on your mobile number.
- The Question Paper comprises three sections:
Logical Reasoning (10 Questions), **Science** (35 Questions) and **Achievers Section** (5 Questions)
Each question in Achievers Section carries 3 marks, whereas all other questions carry one mark each.
- All questions are compulsory. There is no negative marking. Use of calculator is not permitted.
- There is only ONE correct answer. Choose only ONE option for an answer.
- To mark your choice of answers by darkening the circles on the OMR Sheet, use **HB Pencil** or **Blue / Black ball point pen** only. E.g.
Q.16: In the water cycle, condensation is the process of
A. Water vapour cooling down and turning into a liquid B. Ice warming up and turning into a liquid
C. Liquid cooling down and turning into ice D. Liquid warming up and turning into water vapour
As the correct answer is option A, you must darken the circle corresponding to option A on the OMR Sheet.
- Rough work should be done in the blank space provided in the booklet.
- Return the OMR Sheet to the invigilator at the end of the exam.
- Please fill in your personal details in the space provided before attempting the paper.
- For classes 8, 9 & 10, "Innovation Challenge" is being conducted by Techfest IIT Bombay in association with SOF. For details, please visit : www.sofworld.org/sof-techfest-iit-bombay-innovation-challenge2023**



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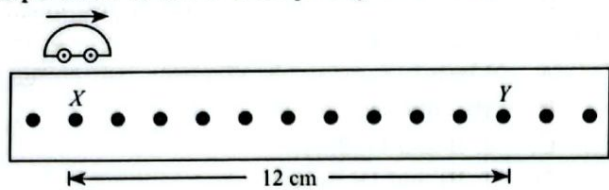
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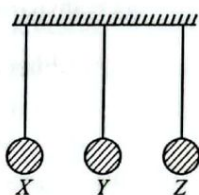
7
Olympiads

11. Rahul uses a ticker tape to measure speed of a remote control car as shown in the given figure. The ticker tape timer is set to a frequency of 50 Hz.



Average speed of the car between points X and Y is

- A. 30 cm/s B. 60 cm/s
C. 40 cm/s D. 20 cm/s
12. Consider three pendulums as shown in the given figure. Length of each pendulum is 50 cm. Mass of pendulum X is 2 kg, pendulum Y is 8 kg and that of pendulum Z is 16 kg. If their corresponding time periods are T_x , T_y and T_z , then (neglect air resistance)



- A. $T_x < T_y < T_z$
B. $T_x > T_y > T_z$
C. $T_x = T_y = T_z$
D. $T_x = \frac{T_y}{2} = \frac{T_z}{4}$

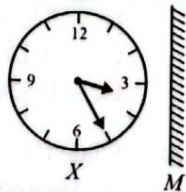
13. Read the given statements and select the option that correctly identifies them as true (T) and false (F) ones.

- (i) Oceanic crust is less dense compared to continental crust.
(ii) There are three planets in solar system that does not have natural satellites.
(iii) Only two planets of solar system rotate East to West while other planets of solar system rotates West to East.
(iv) The only reason of occurrence of seasons in a year is the spinning of the Earth.

	(i)	(ii)	(iii)	(iv)
A.	F	F	T	F
B.	T	T	F	T
C.	T	F	T	T
D.	F	T	T	T

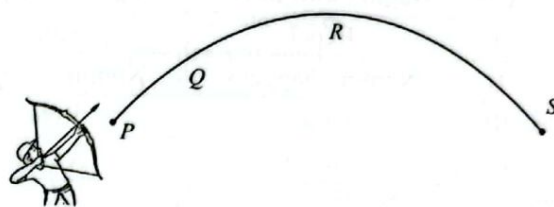
14. A clock X is placed in front of a mirror M as shown in the given figure. Time in the mirror image of X is

- A. 3 : 25
B. 8 : 35
C. 7 : 35
D. 6 : 35



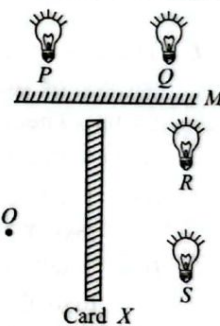
15. An archer shoots arrows using a bow. The bow is made of a string that stretches when it is pulled and recoils when the arrow is released as shown in the

given figures. The respective energy changes during the process, when the bow is stretched and released, then arrow flies and reaches to the highest position R, are



- A. Kinetic energy → Elastic potential energy → Heat energy
B. Elastic potential energy → Kinetic energy → Gravitational potential energy
C. Gravitational potential energy → Elastic potential energy → Kinetic energy
D. Elastic potential energy → Gravitational potential energy → Kinetic energy

16. Four lamps P, Q, R and S are placed around a mirror M, as shown in the given figure.



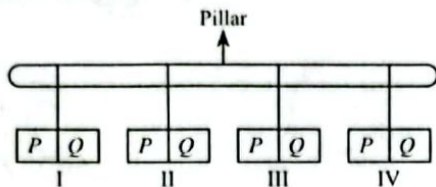
The card X prevents the observer O from seeing the lamps directly. Which of the following statements are incorrect?

- I. Observer O can see the image of R.
II. Observer O can see the image of S.
III. Observer O cannot see the image of P.
IV. Observer O can see the image of Q.
- A. I and IV only B. II and III only
C. III and IV only D. II, III and IV only

17. Which of the following statements are correct?

- (i) The Sun is mostly made up of hydrogen gas which is continuously changing to helium by nuclear fusion reactions.
(ii) The light which we get on the Earth comes from corona layer of the Sun.
(iii) Mars is sometimes called the red planet as it is closest to the Sun among all other planets and hence get highest energy from the Sun.
(iv) The nuclear fusion reactions take place in core of the Sun.
- A. (i), (iii) and (iv) only B. (ii) and (iv) only
C. (i) and (iv) only D. (i), (ii) and (iv) only

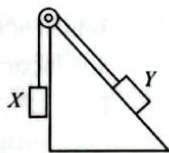
18. Arpita suspends four bars of different materials from a pillar and bring the north pole of a bar magnet near part P and Q of each bar one by one as shown in the given figure. Then she records the observations, which are given below.



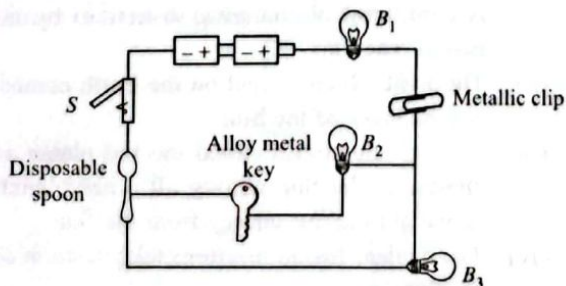
Bar	Magnet and part P	Magnet and part Q
I	Repel	Attract
II	Nothing happens	Nothing happens
III	Attract	Repel
IV	Attract	Attract

Which one of the following sets correctly represents bars I, II, III and IV?

- | Bar I | Bar II | Bar III | Bar IV |
|------------------------|------------|-----------|------------|
| A. Magnet | Wooden bar | Magnet | Iron bar |
| B. Magnet | Iron bar | Magnet | Glass bar |
| C. Stainless steel bar | Magnet | Iron bar | Magnet |
| D. Magnet | Iron bar | Glass bar | Copper bar |
19. There is no friction involved in the pulley and in the surface of the inclined plane as shown in the given figure. Then, which of the following statement(s) is/are correct?
- Y will slide down if it is heavier than X.
 - Y will slide up if X is heavier than Y.
 - Y can slide up even if X is lighter than Y.
 - X will slide up even if X is heavier than Y.
- A. (i), (ii) and (iii) only
 B. (i) and (ii) only
 C. (ii) only
 D. (i), (iii) and (iv) only



20. An electric circuit is given below.



Study the circuit and explain why all the bulbs did not light up when the switch (S) was closed?

- The metal tip of bulb B_1 was not connected.
 - Bulb B_2 and the alloy metal key closed the electric circuit.
 - The plastic disposable spoon was not an electrical conductor.
 - Bulbs B_1 and B_3 were incorrectly positioned in the electric circuit.
- A. I only
 B. III only
 C. I, II and IV only
 D. I, III and IV only

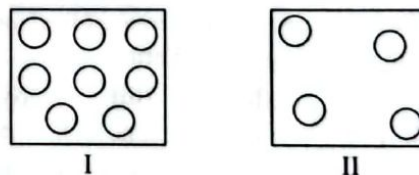
21. Which of the following substances has definite volume, but no definite shape?
- A. Carbon dioxide
 B. Apple juice
 C. Silver foil
 D. Ceramic cup

22. Classify the substances given in the following box as transparent, translucent and opaque.

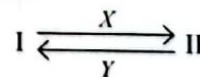
Rubber ball (i)	Newspaper (ii)	Butter paper (iii)
Leather bag (iv)	Magnifying glass (v)	Fresh air (vi)

- | Transparent | Translucent | Opaque |
|------------------------|----------------|--------------------|
| A. (iii), (v) and (vi) | (ii) | (i) and (iv) |
| B. (v) and (vi) | (iii) | (i), (ii) and (iv) |
| C. (vi) | (iii) and (v) | (i), (ii) and (iv) |
| D. (vi) | (ii) and (iii) | (i), (iv) and (v) |

23. Rohit, a science teacher has drawn the diagrams showing the arrangement of particles in two different states of water.



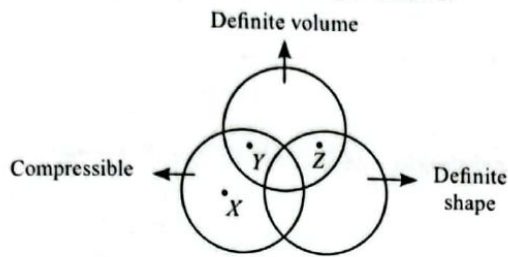
Observe the following conversions carefully and select the correct option.



- A. I-Solid, Y-Condensation
 B. I-Liquid, X-Freezing
 C. II-Liquid, Y-Evaporation
 D. II-Gas, X-Evaporation
24. Classify the given substances into elements and compounds and select the correct option.
- Gold
 - Glucose
 - Oxygen
 - Iron
 - Water

	Element	Compound
A.	I, IV, V	II, III
B.	IV	I, II, III, V
C.	I, III, IV	II, V
D.	II, V	I, III, IV

25. Study the following Venn diagram and select the option that correctly identifies X, Y and Z.



	X	Y	Z
A.	Water vapours	Carbon dioxide	Iron rod
B.	Salt	Notebook	Milk
C.	Ceramic tile	Marble	Oxygen
D.	Nitrogen	Syrup	Book

26. Match column I with column II and select the correct option from the given codes.

Column I (Material)	Column II (Characteristics)
(i) Polythene	(a) Translucent
(ii) Gold coin	(b) Floats on water
(iii) Sugar powder	(c) Easily moulded
(iv) Feather	(d) Soluble in water
(v) Frosted glass	(e) Sinks in water
A. (i)-(c), (ii)-(e), (iii)-(d), (iv)-(b), (v)-(a)	
B. (i)-(a), (ii)-(c), (iii)-(b), (iv)-(e), (v)-(d)	
C. (i)-(b), (ii)-(a), (iii)-(d), (iv)-(c), (v)-(e)	
D. (i)-(c), (ii)-(a), (iii)-(e), (iv)-(b), (v)-(d)	

27. Which of the following statements are incorrect?
- Fat is removed from milk by using a separating funnel.
 - A mixture containing two miscible liquids can be separated by distillation process.
 - Threshing is used to separate husk from grains, which involves beating the bundles of grains to remove the husk.
 - A mixture of sugar powder and naphthalene powder can be separated by sieving.
- | | |
|-----------------------|----------------------|
| A. I and II only | B. II and III only |
| C. I, III and IV only | D. I, II, III and IV |

28. Three groups of materials are given below :

I : Salt, sugar, flour
 II : Copper, gold, silver
 III : Petrol, kerosene, paper

Identify the property common to each group and select the correct option.

	I	II	III
A.	Solid	Bad conductors of heat	Liquid
B.	Edible	Non-metallic	Non-inflammable
C.	Edible	Metallic	Inflammable
D.	Solid	Good conductors of heat	Non-inflammable

29. Two liquids P and Q are such that P is miscible, while Q is immiscible with water. P and Q can be respectively

- Glycerine and coconut oil
- Vinegar and lemon juice
- Chalk powder and sand
- Mustard oil and milk.

30. Select the incorrect match.

Vitamin/Mineral	Deficiency disease/symptom
A. Vitamin K	- Excessive bleeding after injury
B. Calcium	- Weak bones and teeth
C. Vitamin A	- Goitre
D. Fluorine	- Dental caries

31. The given options show a list of different foods eaten by four students during their lunch time. Who among them has eaten a balanced diet?

- Ruhi : Chapati, rice and pulses
- Navya : Chapati and pulses
- Deepti : Fruit salad and yogurt
- Shruti : Chapati, ghee, pulses, vegetables, yogurt and fruit salad

32. Refer to the given groups (i) - (iii). Each group contains an odd member. Identify the odd member in each group and select the correct option.

- Calcium, Potassium, Iodine, Sodium
- Vitamin A, Vitamin B, Vitamin D, Vitamin E
- Oil, Tofu, Butter, Ghee

(i)	(ii)	(iii)
A. Calcium	Vitamin D	Butter
B. Iodine	Vitamin B	Tofu
C. Sodium	Vitamin E	Oil
D. Potassium	Vitamin A	Ghee

33. Identify the type of root system shown in the given figure and select the plant that has the same type of root system.



- | | |
|------------|--------------|
| A. Mustard | B. Sugarcane |
| C. Barley | D. Wheat |

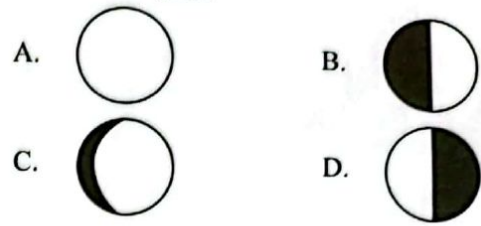
44. Given below are the names of few rocks.

Obsidian, Pumice, Shale, Conglomerate, Gneiss, Quartzite

How many among them are igneous rocks?

- A. 2
- B. 3
- C. 4
- D. 5

45. Sharanya observed New Moon on 20th March, 20XX. What shape of Moon will she observe on 31st March of the same year?

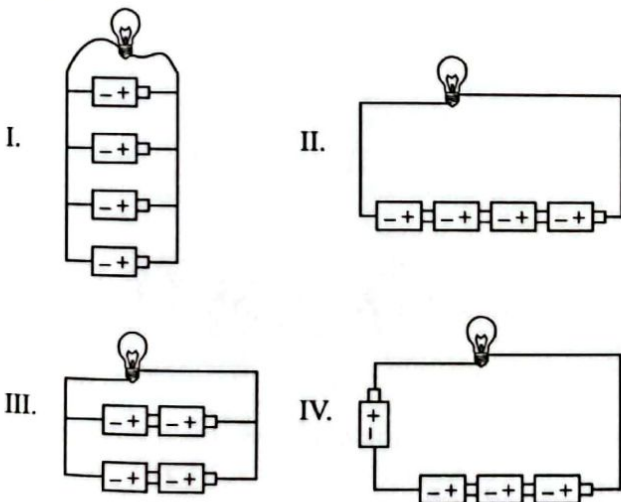


ACHIEVERS SECTION

46. Fill in the blanks by selecting an appropriate option. A mixture contains different substances *P*, *Q* and *R*. *P* is a solid that is soluble in water. Particles of *Q* are small and are insoluble in water. On the other hand, *R* is a liquid which is immiscible in water. Substance *Q* is separated from the mixture by method *x* . Substance *P* is separated from the mixture by method *y* . Substance *R* is separated from the mixture by method *z* .

	<i>x</i>	<i>y</i>	<i>z</i>
A.	Filtration	Handpicking	Distillation
B.	Evaporation	Filtration	Distillation
C.	Filtration	Evaporation	Separating funnel
D.	Hand picking	Distillation	Evaporation

47. Four circuits are connected as shown in the given figures. Here all the bulbs and the batteries (ideal) are identical.



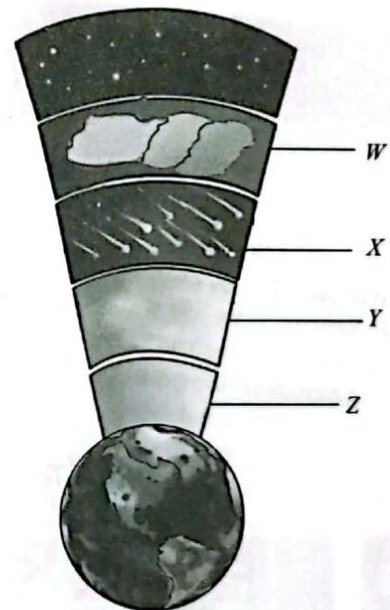
Read the given statements and select the option that correctly identifies them as true (T) and false (F) ones.

- (i) Bulb of circuit (I) would light up the brightest.
- (ii) Bulb of circuit (II) would light up the brightest.
- (iii) Bulbs of circuits (III) and (IV) will be equally bright.

(iv) Bulb of circuit (I) will be the dimmest.

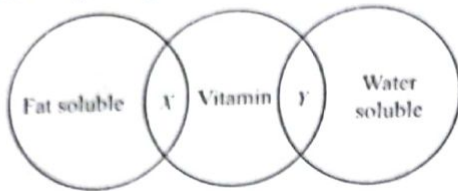
	(i)	(ii)	(iii)	(iv)
A.	T	T	F	F
B.	T	F	F	T
C.	F	T	F	F
D.	F	T	T	T

48. Refer to the given figure showing different layers of atmosphere. Identify the layers *W*, *X*, *Y* and *Z* and select the incorrect statement regarding them.



- A. Layer *Z* is responsible for weather changes that take place on Earth, while layer *Y* protects us from the ultraviolet rays of the Sun.
- B. Air temperature decreases with altitude in layer *Z*, while air temperature gradually increases with altitude in layer *Y*.
- C. Layer *X* is the hottest layer of the atmosphere, while layer *W* is the coldest.
- D. Ozone layers present in layer *Y*, while Low Earth Orbit satellites orbit around the Earth in layer *W*.

49. Refer to the given Venn diagram and select the incorrect statement regarding X and Y .



- A. X could be a vitamin that helps in clotting of blood whereas Y could be a vitamin that helps in formation of blood.
 B. Deficiency of X could cause night blindness whereas deficiency of Y could cause pellagra.
 C. X could be obtained from fish liver oil whereas Y could be obtained from citrus fruits.
 D. None of these

50. Arun categorised living organisms on the basis of their habitat. He made three groups of three organisms each but placed one wrong member in each group. Identify the wrong member and select the correct option.

Group I : Toucan, Gorilla, Reindeer

Group II : Polar bear, Rattlesnake, Arctic fox

Group III : Camel, Kangaroo rat, Red-eyed tree frog

- A. Reindeer of group I should be replaced with macaw.
 B. Rattlesnake of group II should be interchanged with camel of group III.
 C. Kangaroo rat of group III should be interchanged with toucan of group I.
 D. Gorilla of group I should be interchanged with arctic fox of group II.

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