MINDATHON SCIENCE OLYMPIAD (MSO)

CLASS- X

TEST PAPER

Time: 1 hour **Max Marks: 50**

General Instructions:

- **There are a total of 45 questions in this test.**
- **Read each question carefully and answer all of them.**
- **All the answers must be correctly marked in the OMR sheet provided to you.**
- **Questions (1–30 & 36-45) carry one mark each. Questions in the 'Mindathon Little Scientists' (31-35) carry 2 marks each.**

SECTION A: GENERAL SCIENCE AND SCIENTIFIC AWARENESS

1. Which of the following is getting reduced in the following reaction?
   $Fe_2O_3 + 3CO \rightarrow 2\ Fe + 3CO_2$
   a) CO b) Fe
   c) CO_2 d) Fe_2O_3
2. Exposure of silver chloride to sunlight for a long duration turns it grey due to-
   a) Formation of silver
   b) Sublimation of silver chloride
   c) Evolution of chlorine gas
   d) Oxidation of silver chloride
3. A solution turns red litmus blue. Its pH is likely to be
   a) 1 b) 4
   c) 5 d) 10
4. pH of rain water is.....than distilled water.
   a) More b) Less
   c) Cannot be compared d) None of these
5. An alloy is an example of
   a) An element b) A mixture
   c) An isomer d) A metalloid
6. Which option indicates the parts of gynoecium?
   a) Pollen grain, filament, ovary, tube nucleus
   b) Polar nuclei, stigma, ovule, style
   c) Style, stamen, stigma, generative nucleus
   d) Ovary, anther, filament, polar nuclei
7. Which is NOT TRUE about acid fermentation?
   a) Glycolysis is the initial phase.
   b) Glucose is broken down incompletely.
   c) Only two ATP molecules are generated.
   d) Carbon dioxide is liberated.

8. Which is NOT TRUE about Meiosis?
   a) Meiosis reduces the number of chromosomes to half.
   b) Meiosis occurs during gametogenesis.
   c) Meiosis I results in two daughter cells.
   d) Meiosis I is similar to Mitosis.
9. Identify the correct statement related to dark reaction of photosynthesis.
   a) Takes place in the stroma
   b) Formation of ATP
   c) Formation of glucose
   d) All of these
10. The SI unit of resistivity is:
   a) ohm
   b) ohm/meter
   c) ohm-meter
   d) None of these
11. The focal length of concave lens is 25 cm. Then its power will be :
   a) 40 D
   b) - 4 D
   c) –40 D
   d) All of these
12. To rectify short sightedness in eye, we use which lens?
   a) Cylindrical lens
   b) Bifocal lens
   c) Convex lens
   d) Concave lens
13. Fleming left hand rule is used to find
   a) Direction of magnetic field due to current carrying conductor
   b) Direction of induced current
   c) Direction of force on a current carrying conductor in a magnetic field
   d) None of these
14. An electric generator converts
   a) Electric energy into mechanical energy
   b) Mechanical energy into thermal energy
   c) Mechanical energy into electric energy
   d) Electric energy into chemical energy
15. The physical state of water at 298 K temperature is:
   a) Gaseous
   b) Solid
   c) Liquid
   d) Plasma

SECTION B: EVERYDAY SCIENCE

16. Buckminsterfullerene is an allotropic form of
   a) Phosphorus
   b) Sulphur
   c) Carbon
   d) Tin
17. The compound containing both ionic and covalent bond is
   a) $AlCl_3$
   b) CaO
   c) $MgCl_2$
   d) NH_4Cl
18. The gas produced when manganese-dioxide is treated with hydrochloric acid is
   a) Cl_2
   b) O_2
   c) H_2
   d) H_2O
19. Which of the following reactions is not possible:
   a) $Ca + H_2SO_4 \rightarrow CaSO_4 + H_2$
   b) $Cu + H_2SO_4 \rightarrow CuSO_4 + H_2$
   c) $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$
   d) $Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$
20. Main objective of smelting of ore is:
   a) To oxidise ore
   b) To reduce ore
   c) To remove volatile impurities
   d) Alloy formation
21. Plaster of paris hardens by :
   a) Losing $CaCl_2$
   b) Absorbing CO_2
   c) Absorbing water
   d) Releasing water
22. The nutritive element found in large amount in soyabean and pulses is
   a) Fat
   b) Carbohydrate
   c) Mineral
   d) Protein

23. In our body, which organ is responsible for conversion of ammonia to urea?
a) Kidney b) Lungs c) Liver d) Heart

24. A patient is generally advised to consume more meat, lentils, milk and eggs in diet when he suffers from:
a) Scurvy b) Anaemia c) Rickets d) Kwashiorkor

25. When we sleep at night and are bit by a mosquito we often try to kill the mosquito. This action is controlled by:
a) Pituitary gland b) Spinal Cord and brain
c) Hormones d) Pineal gland

26. An object of height 2.0cm is placed on the principal axis of a concave mirror at a distance of 12cm from the pole. If the image is inverted, real and 5cm in height, then location of the image and focal length of the mirror respectively are
a) (–30cm, +8.6cm) b) (–30cm, –8.6cm)
c) (+30cm, +8.6cm) d) (+30cm, –8.6cm)

27. Light travels through a glass slab of thickness t and having refractive index n. If c is the velocity of light in vacuum, then the time taken by light to travel this thickness of glass is
a) nt/c b) nc/t c) tc/n d) t/nc

28. The stakeholders of various forest products are
(i) People living near forests (ii) Government only
(iii) Nature lovers (iv) Wild life
a) All options are correct b) Only (I), (ii) and (iii) is correct
c) Only (ii) is incorrect d) None of the options is correct

29. The following metals are arranged in the increasing order of their metallic character. Choose the correct option.
a) Be < Si < K < Al b) Si < Be < Al < K c) K < Al < Si < Be d) Be <Si < Al<K

30. Which of the following is NOT correct for magnetic field lines?
a) The direction of magnetic field lines outside the magnet is from north pole to south pole.
b) The direction of magnetic field lines inside the magnet is from south pole to north pole.
c) The degree of closeness of magnetic field lines tells the relative strength of magnetic field.
d) Magnetic field lines never form closed loop.

SECTION C: MINDATHON LITTLE SCIENTISTS

31. The key steps for the manufacture of sulphuric acid by contact process are given below. Which of the following are favorable for the contact process?
(P) Pressure of 2 atm and temperature of about 450° C
(Q) Reaction of SO_2 and O_2
(R) Use of V_2O_2 as catalyst
(S) Removal of oleum
Choose the correct alternative:
a) (P) and (Q) b) (P), (Q) and (R) c) (Q), (R) and (S) d) (P), (R) and (S)

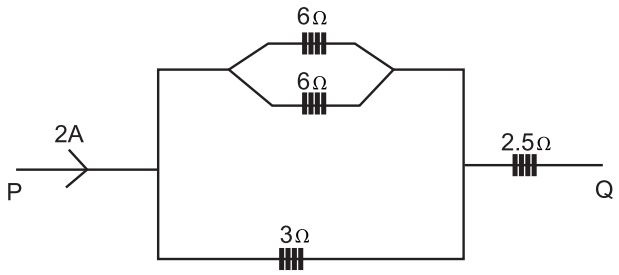
32. Match the following columns:

COLUMN – I	COLUMN – II
A Eye wash	P Carbonic acid
B Food preservation	Q Tartaric acid
C Baking powder	R Citric acid
D Flavouring drinks	S Oxalic acid

a) A – T, B – R, C – Q, D – P b) A – R, B – Q, C – T, D – S
c) A – S, B – R, C – Q, D – T d) A – S, B – R, C – Q, D – P

33. Which of the following does NOT describe a ray that can be drawn for a concave mirror?
 a) An incident ray through the centre of curvature, reflecting right back through the centre of curvature
 b) An incident ray through the centre of curvature, reflecting through the focal point
 c) An incident ray through the focal point, reflecting parallel to the principal axis
 d) An incident ray parallel to the principal axis, reflecting through the focal point

34. The potential difference between the point P and Q for the given network is



a) 8V b) 35V c) 1V d) 7V

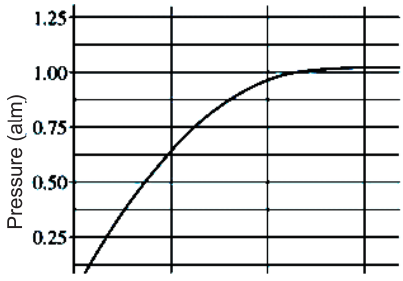
35. UV rays cause cancer but in the stratosphere the same UV rays are helping us, how?
 a) They divert harmful UV rays back to the sun.
 b) They convert oxygen in the stratosphere into ozone.
 c) UV rays are not present in the stratosphere.
 d) UV rays reach the earth surface, then bounce back carrying ozone to the stratosphere.

SECTION D: CASE STUDIES

I. The story of marble's popularity takes us back to the ancient era of Rome and Greece. The white and off-white marble was extensively used in that period in order to construct a variety of structures, be it hand-held sculptures or massive pillars, buildings, statues and what not. These are the heritage of the modern world to draw inspiration from and to think innovatively, ahead of primitive technologies.

36. The substance among the following which might not contain $CaCO_3$ is
 a) Sea shells b) A marble statue
 c) Calcined gypsum d) Dolomite

37. 10g of calcium carbonate was secured it tightly in a jar and heated. After some time, an increase in pressure was observed, which varied as per the following graph, recordings taken every five minutes.



During which time interval did maximum decomposition occur?
 a) 15-20 min b) 10-15 min c) 5-10 min d) 0-5 min

38. The gas which led to such an increase in pressure is an important ingredient of
 a) Respiration b) Photosynthesis c) Transpiration d) Photolysis

39. Marble statues are observed to corrode due to rain water because
    a) calcium carbonate decomposes into calcium oxide
    b) polluted water is basic in nature
    c) polluted water is acidic in nature
    d) calcium carbonate dissolves in water to give calcium hydroxide.
40. Calcium oxide is heated with sodium metal. Which compound would act as an oxidizing agent in the above process?
    a) Sodium b) sodium oxide c) calcium d) calcium oxide

II. The Yamuna River in India is one of the most polluted rivers in the world. The river's pollution is caused by a number of factors. More than 800 million litres of largely untreated sewage is pumped in the Yamuna each day. Another 44 million litres of industrial effluents are also discharged daily into the river. Sewage that is treated before being released into the river accounts for only 35% of the total estimated sewage discharge.

41. Predict the pH value of the water of river Yamuna if a sample of its water has high content of detergents dissolved in it.
    a) 10-11 b) 5-7 c) 2-5 d) 7
42. Which of the following statements is correct for the water with detergents dissolved in it?
    a) low concentration of OH^- ion and high concentration of H_3O^+ ion
    b) high concentration of OH^- ion and low concentration of H_3O^+ ion
    c) high concentration of OH^- ion and high concentration of H_3O^+ ion
    d) equal concentration of both hydroxide ion and hydronium ion
43. The pH value of four solutions P, Q, R and S are 2, 9, 5 and 11 respectively.Arrange them in increasing order of their hydronium ion concentration.
    a) P>Q>R>S b) P>S>Q>R c) S<Q<R<P d) S<P<Q<R
44. High content of phosphate ion in river Yamuna may lead to:
    a) decreased level of dissolved oxygen and increased growth of algae
    b) decreased level of dissolved oxygen and no effect of growth of algae
    c) increased level of dissolved oxygen and increased growth of algae
    d) decreased level of dissolved oxygen and decreased growth of algae
45. If a sample of water containing detergents is provided to you, which of the following methods will you adopt to neutralize it?
    a) Treating the water with baking soda
    b) Treating the water with vinegar
    c) Treating the water with caustic soda
    d) Treating the water with washing soda