Series : JSK/2

SET – 4

प्रश्न पत्र कोड नं.
Question paper Code No. **031/2/4**

रोल नं.
Roll No.

परीक्षार्थी QP कोड को OMR उत्तर-पत्रक के मुख-पृष्ठ पर अवश्य लिखें ।
Candidates must write / fill the QP Code in the space allotted on OMR Sheet.

नोट / NOTE :

(i) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **32** हैं ।
Please check that this question paper contains **32** printed pages.

(ii) कृपया जाँच कर लें कि इस प्रश्न-पत्र में **60** बहुविकल्पीय प्रश्न (MCQs) हैं ।
Please check that this question paper contains **60** multiple choice questions (MCQs.)

(iii) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए QP कोड नम्बर को छात्र OMR शीट में उपयुक्त स्थान पर लिखें ।
QP Code given on the right hand side of the question paper should be written on the appropriate place of the OMR Sheet by the candidates.

(iv) परीक्षा शुरू होने के वास्तविक समय से पहले इस प्रश्न-पत्र को पढ़ने के लिए **20** मिनट का अतिरिक्त समय आबंटित किया गया है ।
20 minute additional time has been allotted to read this question paper prior to actual time of commencement of examination.

विज्ञान (सैद्धान्तिक)
Science (Theory)
सत्र – I / Term – I

निर्धारित समय : 90 मिनट
Time allowed : 90 minutes

अधिकतम अंक : 40
Maximum Marks : 40

General Instructions :

Read the following instructions very carefully and strictly follow them :

(i) *This question paper contains 60 questions out of which 50 questions are to be attempted. All questions carry equal marks.*

(ii) *The question paper consists three Sections – Section A, B and C.*

(iii) ***Section – A** consists of 24 questions. Attempt any 20 questions from Q. No. 1 to 24.*

(iv) ***Section – B** also consists of 24 questions. Attempt any 20 questions from Q. No. 25 to 48.*

(v) ***Section – C** consists of three Case Studies containing 12 questions and 4 questions in each case. Attempt any 10 from Q. No. 49 to 60.*

(vi) *There is only one correct option for every Multiple Choice Question (MCQ). Marks will not be awarded for answering more than one option.*

(vii) *There is no negative marking.*

SECTION – A

Section-A consists of 24 questions (Q. No. 1 to 24). Attempt any 20 questions from this section. The first attempted 20 questions would be evaluated.

1. A student took Sodium Sulphate solution in a test tube and added Barium Chloride solution to it. He observed that an insoluble substance has formed. The colour and molecular formula of the insoluble substance is :

(a) Grey, Ba_2SO_4 (b) Yellow, $Ba(SO_4)_2$

(c) White, $BaSO_4$ (d) Pink, $BaSO_4$

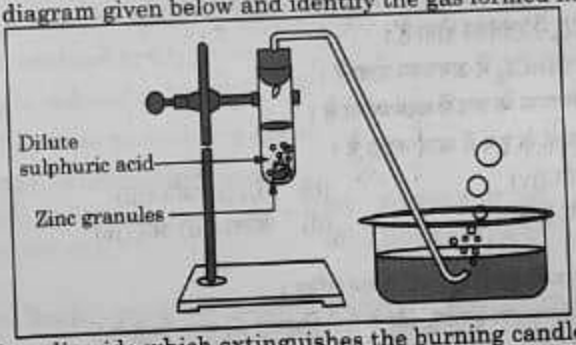
2. Which of the following oxide(s) is/are soluble in water to form alkalies ?

(i) Na_2O (ii) SO_2 (iii) K_2O (iv) NO_2

(a) (i) and (iii) (b) (i) only

(c) (ii) and (iv) (d) (iii) only

3. Study the diagram given below and identify the gas formed in the reaction.



(a) Carbon di-oxide which extinguishes the burning candle.

(b) Oxygen due to which the candle burns more brightly.

(c) Sulphur dioxide which produces a suffocating smell.

(d) Hydrogen which while burning produces a popping sound.

4. Sodium reacts with water to form sodium hydroxide and hydrogen gas. The balanced equation which represents the above reaction is:

(a) $Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + 2H_2(g)$

(b) $2Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + H_2(g)$

(c) $2Na(s) + 2H_2O(l) \rightarrow NaOH(aq) + 2H_2(g)$

(d) $2Na(s) + H_2O(l) \rightarrow 2NaOH(aq) + 2H_2(g)$

5. Which of the options in the given table are correct ?

Option	Natural Source	Acid Present
(i)	Orange	Oxalic acid
(ii)	Sour milk	Lactic acid
(iii)	Ant sting	Methanoic acid
(iv)	Tamarind	Acetic acid

(a) (i) and (ii) (b) (i) and (iv)

(c) (ii) and (iii) (d) (iii) and (iv)

6. $C_6H_{12}O_6(aq) + 6O_2(aq) \rightarrow 6CO_2(aq) + 6H_2O(l)$

The above reaction is a/an

(a) displacement reaction (b) endothermic reaction

(c) exothermic reaction (d) neutralisation reaction

7. Which of the following statements about the reaction given below are correct ?

$MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

(i) HCl is oxidized to Cl_2

(ii) MnO_2 is reduced to $MnCl_2$

(iii) $MnCl_2$ acts as an oxidizing agent

(iv) HCl acts as on oxidizing agent

(a) (ii), (iii) and (iv) (b) (i), (ii) and (iii)

(c) (i) and (ii) only (d) (iii) and (iv) only

8. Select from the following the statement which is true for bases.

(a) Bases are bitter and turn blue litmus red.

(b) Bases have a pH less than 7.

(c) Bases are sour and change red litmus to blue.

(d) Bases turn pink when a drop of phenolphthalein is added to them.

9. Study the following table and choose the correct option :

	Salt	Parent Acid	Parent Base	Nature of Salt
(a)	Solidum Chloride	HCl	NaOH	Basic
(b)	Sodium Carbonate	H_2CO_3	NaOH	Neutral
(c)	Sodium Sulphate	H_2SO_4	NaOH	Acidic
(d)	Sodium Acetate	CH_3COOH	NaOH	Basic

10. It is important to balance the chemical equations to satisfy the law of conservation of mass. Which of the following statements of the law is incorrect ?
   (a) The total mass of the elements present in the reactants is equal to the total mass of the elements presents in the products.
   (b) The number of atoms of each element remains the same, before and after a chemical reaction.
   (c) The chemical composition of the reactants is the same before and after the reaction.
   (d) Mass can neither be created nor can it be destroyed in a chemical reaction.

11. Consider the following statements in connection with the functions of the blood vessels marked A and B in the diagram of a human heart as shown.

   (i) Blood vessel A – It carries carbon dioxide rich blood to the lungs.
   (ii) Blood vessel B – It carries oxygen rich blood from the lungs.
   (iii) Blood vessel B – Left atrium relaxes as it receives blood from this blood vessel
   (iv) Blood vessel A – Right atrium has thick muscular wall as it has to pump blood to this blood vessel.

   The correct statements are
   (a) (i) and (ii) only
   (b) (ii) and (iii) only
   (c) (ii), (iii) and (iv)
   (d) (i), (ii) and (iii)

12. In living organisms during respiration which of the following products are not formed if oxygen is not available ?

(a) Carbon dioxide + Water
(b) Carbon dioxide + Alcohol
(c) Lactic acid + Alcohol
(d) Carbon dioxide + Lactic Acid

13. The correct statements with reference to single celled organisms are

(i) Complex substances are not broken down into simpler substances.
(ii) Simple diffusion is sufficient to meet the requirement of exchange of gases.
(iii) Specialised tissues perform different functions in the organism.
(iv) Entire surface of the organism is in contact with the environment for taking in food.

(a) (i) and (iii)
(b) (ii) and (iii)
(c) (ii) and (iv)
(d) (i) and (iv)

14. Which one among the following is not removed as a waste product from the body of a plant ?

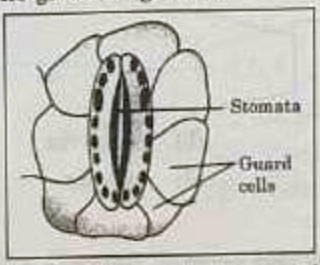
(a) Resins and Gums
(b) Urea
(c) Dry Leaves
(d) Excess Water

15. Which of the following statements are correct in reference to the role of A (shown in the given diagram) during a breathing cycle in human beings ?

(i) It helps to decrease the residual volume of air in lungs.
(ii) It flattens as we inhale.
(iii) It gets raised as we inhale.
(iv) It helps the chest cavity to become larger.

(a) (ii) and (iv)
(b) (iii) and (iv)
(c) (i) and (ii)
(d) (i), (ii) and (iv)

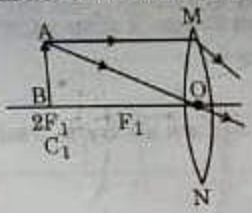
16. Which one of the following conditions is true for the state of stomata of a green leaf shown in the given diagram ?

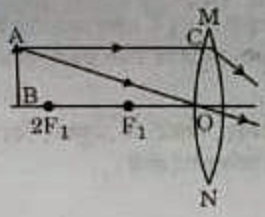


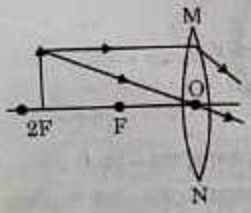
(a) Large amount of water flows into the guard cells.
(b) Gaseous exchange is occurring in large amount.
(c) Large amount of water flows out from the guard cells.
(d) Large amount of sugar collects in the guard cells.

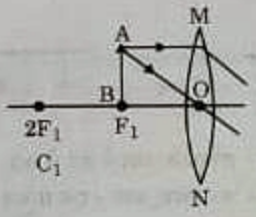
17. In which of the following is a concave mirror used ?
(a) A solar cooker
(b) A rear view mirror in vehicles
(c) A safety mirror in shopping malls
(d) In viewing full size image of distant tall buildings.

18. A student wants to obtain magnified image of an object AB as on a screen. Which one of the following arrangements shows the correct position of AB for him/her to be successful ?

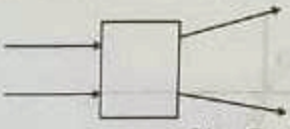
(a)


(b)


(c)


(d)


19. The following diagram shows the use of an optical device to perform an experiment of light. As per the arrangement shown, the optical device is likely to be a;



(a) Concave mirror
(b) Concave lens
(c) Convex mirror
(d) Convex lens

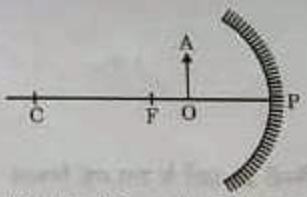
20. A ray of light starting from air passes through medium A of refractive index 1.50, enters medium B of refractive index 1.33 and finally enters medium C of refractive index 2.42. If this ray emerges out in air from C, then for which of the following pairs of media the bending of light is least ?

(a) air-A
(b) A-B
(c) B-C
(d) C-air

21. Which of the following statements is <u>not true</u> for scattering of light ?

(a) Colour of the scattered light depends on the size of particles of the atmosphere.
(b) Red light is least scattered in the atmosphere.
(c) Scattering of light takes place as various colours of white light travel with different speed in air.
(d) The fine particles in the atmospheric air scatter the blue light more strongly than red. So the scattered blue light enters our eyes.

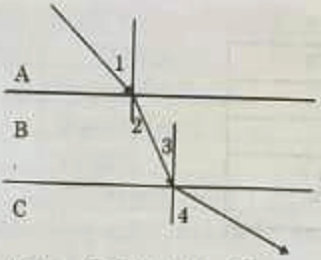
22.



For the diagram shown, according to the new Cartesian sign convention the magnification of the image formed will have the following specifications :

(a) Sign – Positive, Value – Less than 1
(b) Sign – Positive, Value – More than 1
(c) Sign – Negative, Value – Less than 1
(d) Sign – Negative, Value – More than 1

23.

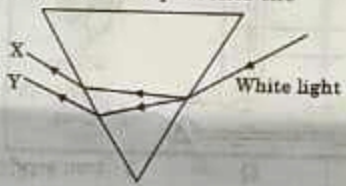


A ray of light is incident as shown. If A, B and C are three different transparent media, then which among the following options is true for the given diagram ?

(a) $\angle 1 > \angle 4$ (b) $\angle 1 < \angle 2$

(c) $\angle 3 = \angle 2$ (d) $\angle 3 > \angle 4$

24. In the diagram given below, X and Y are the end colours of the spectrum of white light. The colour of 'Y' represents the



(a) Colour of sky as seen from earth during the day.

(b) Colour of the sky as seen from the moon.

(c) Colour used to paint the danger signals.

(d) Colour of sun at the time of noon

SECTION - B

Section-**B** consists of **24** questions (Q. No. 25 to 48). Attempt any **20** questions from this section. The first attempted **20** questions would be evaluated.

25. Which one of the following reactions is categorised as thermal decomposition reaction ?

(a) $2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$ (b) $2AgBr(s) \rightarrow 2Ag(s) + Br_2(g)$

(c) $2AgCl(s) \rightarrow 2Ag(s) + Cl_2(g)$ (d) $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$

26. Consider the pH value of the following acidic samples :

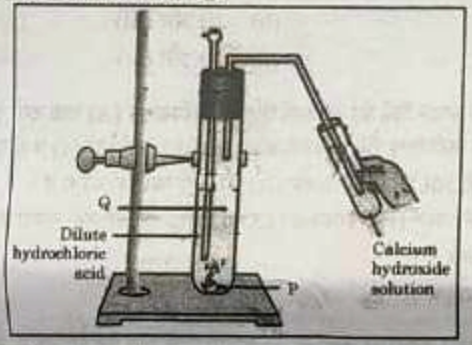
S. No.	Sample	pH Value
1.	Lemon Juice	2.2
2.	Gastric Juice	1.2
3.	Vinegar	3.76
4.	Dil. Acetic acid	3.0

The decreasing order of their H^+ ion concentration is

(a) 3 > 4 > 1 > 2 (b) 2 > 1 > 3 > 4

(c) 2 > 1 > 4 > 3 (d) 3 > 4 > 2 > 1

27. Study the experimental set up shown in given figure and choose the correct option from the following :



	P	Q	Change observed in calcium hydroxide solution
(a)	K_2CO_3	Cl_2 gas	No change
(b)	$KHCO_3$	CO_2 gas	No change
(c)	$KHCO_3$	H_2 gas	Turns milky
(d)	K_2CO_3	CO_2 gas	Turns milky

28. Which one of the following structures correctly depicts the compound $CaCl_2$?

(a) $Ca^{2+}\left[:\ddot{\underset{\cdot\cdot}{Cl}}:\right]^{2-}$ (b) $\left[:\ddot{\underset{\cdot\cdot}{Ca}}:\right]^{2+}\left[:\ddot{\underset{\cdot\cdot}{Cl}}:\right]_2$

(c) $Ca^{2+}\left[:\ddot{\underset{\cdot\cdot}{Cl}}:\right]_2$ (d) $\left[:\ddot{\underset{\cdot\cdot}{Ca}}:\right]^{+}\left[:\ddot{\underset{\cdot\cdot}{Cl}}:\right]^{-}_2$

29. The pair(s) which will show displacement reaction is/are
(i) $NaCl$ solution and copper metal
(ii) $AgNO_3$ solution and copper metal
(iii) $Al_2(SO_4)_3$ solution and magnesium metal
(iv) $ZnSO_4$ solution and iron metal
(a) (ii) only
(b) (ii) and (iii)
(c) (iii) and (iv)
(d) (i) and (ii)

30. Which of the following salts do not have the water of crystalisation ?
(i) Bleaching Powder
(ii) Plaster of Paris
(iii) Washing soda
(iv) Baking soda
(a) (ii) and (iv)
(b) (i) and (iii)
(c) (ii) and (iii)
(d) (i) and (iv)

Question No. 31-35 consists of two statements – **Assertion (A)** and **Reason (R)**. Answer these questions selecting the appropriate option given below :
(a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (R) is true.

31. **Assertion (A)** : Sodium hydrogen carbonate is used as an ingredient in antacids.
Reason (R) : $NaHCO_3$ is a mild non-corrosive basic salt.

32. **Assertion (A)** : Burning of Natural gas is an endothermic process.
Reason (R) : Methane gas combines with oxygen to produce carbon dioxide and water.

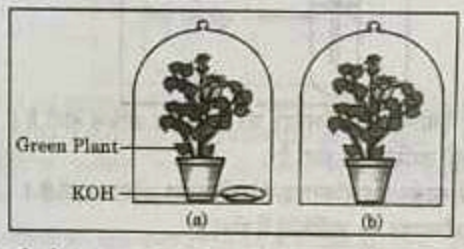
33. **Assertion (A)** : Nitrogen is an essential element for plant growth and is taken up by plants in the form of inorganic nitrates or nitrites.
Reason (R) : The soil is the nearest and richest source of raw materials like Nitrogen, Phosphorus and other minerals for the plants.

34. **Assertion (A)** : Sun appears reddish at the time of Sunrise and Sunset.
Reason (R) : Distance travelled by sunlight in the atmosphere is lesser during sunrise and sunset as compared to noon.

35. **Assertion (A)** : Hydrochloric acid helps in the digestion of food in the stomach.

Reason (R) : Hydrochloric acid creates an acidic medium to activate protein digesting enzymes.

36. A student was asked to write a stepwise procedure to demonstrate that carbon dioxide is necessary for photosynthesis. He wrote the following steps. The wrongly worded step is –



(a) Both potted plants are kept in dark room for at least three days.

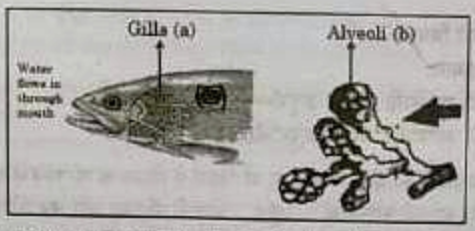
(b) Bottom of the bell jars is sealed to make them air tight.

(c) Both potted plants are kept in sunlight after the starch test.

(d) A leaf from both the plants is taken to test the presence of starch.

37. Respiratory structures of two different animals-a fish and a human being are as shown.

Observe (a) and (b) and select one characteristic that holds true for both of them.



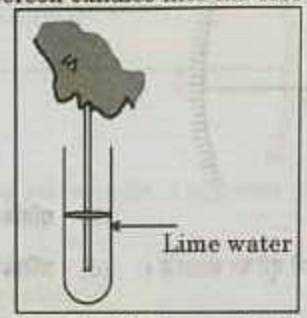
(a) Both are placed internally in the body of animal.

(b) Both have thin and moist surface for gaseous exchange.

(c) Both are poorly supplied with blood vessels to conserve energy.

(d) In both the blood returns to the heart after being oxygenated.

38. Observe the diagram of an activity given below. What does it help to conclude, when the person exhales into the test-tube ?



(a) Percentage of carbon dioxide is more in inhaled air.
(b) Fermentation occurs in the presence of oxygen.
(c) Percentage of carbon dioxide is more in the exhaled air.
(d) Fermentation occurs in the presence of carbon dioxide.

39. If a lens can converge the sun rays at a point 20 cm. away from its optical centre, the power of this lens is –
(a) + 2D (b) – 2D (c) + 5D (d) – 5D

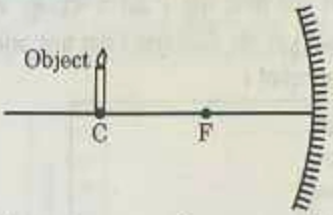
40. The radius of curvature of a converging mirror is 30 cm. At what distance from the mirror should an object be placed so as to obtain a virtual image ?
(a) Infinity (b) 30 cm
(c) Between 15 cm and 30 cm (d) Between 0 cm and 15 cm

41. The length of small intestine in a deer is more as compared to the length of small intestine of a tiger. The reason for this is –
(a) Mode of intake of food.
(b) Type of food consumed.
(c) Presence or absence of villi in intestines.
(d) Presence or absence of digestive enzymes.

42. Identify the two components of Phloem tissue that help in transportation of food in plants.
(a) Phloem parenchyma & sieve tubes
(b) Sieve tubes & companion cells
(c) Phloem parenchyma & companion cells
(d) Phloem fibres and sieve tubes

43. A converging lens forms a three times magnified image of an object, which can be take on a screen. If the focal length of the lens is 30 cm, then the distance of the object from the lens is
(a) – 55 cm (b) – 50 cm (c) – 45 cm (d) – 40 cm

44.



Which of the following statements is <u>not</u> true in reference to the diagram shown above ?

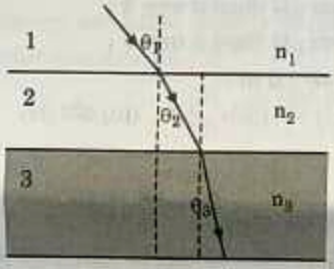
(a) Image formed is real.

(b) Image formed is enlarged.

(c) Image is formed at a distance equal to double the focal length.

(d) Image formed is inverted.

45.



In the diagram shown above n_1, n_2 and n_3 are refractive indices of the media 1, 2 and 3 respectively. Which one of the following is true in this case ?

(a) $n_1 = n_2$ (b) $n_1 > n_2$ (c) $n_2 > n_3$ (d) $n_3 > n_1$

46. The refractive index of medium A is 1.5 and that of medium B is 1.33. If the speed of light in air is 3×10^8 m/s, what is the speed of light in medium A and B respectively ?

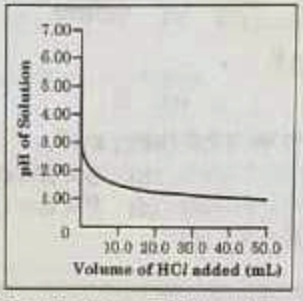
(a) 2×10^8 m/s and 1.33×10^8 m/s (b) 1.33×10^8 m/s and 2×10^8 m/s

(c) 2.25×10^8 m/s and 2×10^8 m/s (d) 2×10^8 m/s and 2.25×10^8 m/s

47. An object of height 4 cm is kept at a distance of 30 cm from the pole of a diverging mirror. If the focal length of the mirror is 10 cm, the height of the image formed is

(a) + 3.0 cm (b) + 2.5 cm (c) + 1.0 cm (d) + 0.75 cm

48. 50.0 mL of tap water was taken in a beaker. Hydrochloric acid was added drop by drop to water. The temperature and pH of the solution was noted. The following graph was obtained. Choose the correct statements related to this activity.



(i) The process of dissolving an acid in water is highly endothermic.

(ii) The pH of the solution increases rapidly on addition of acid.

(iii) The pH of the solution decreases rapidly on addition of acid.

(iv) The pH of tap water was around 7.0.

(a) (i) and (ii) (b) (i) and (iii)

(c) (iii) and (iv) (d) (ii) and (iv)

SECTION – C

Section-C consists of **three** cases followed by questions. There are a total of **12** questions (Q. No. **49** to **60**) in this section. Attempt any **10** questions from this section. The first attempted **10** questions would be evaluated.

Case-I :

A student, took four metals P, Q, R and S and carried out different experiments to study the properties of metals. Some of the observations were :

- All metals could not be cut with knife except metal R.
- Metal P combined with oxygen to form an oxide M_2O_3 which reacted with both acids and bases.
- Reaction with water.
  - P – Did not react either with cold or hot water but reacted with steam
  - Q – Reacted with hot water and the metal started floating
  - R – Reacted violently with cold water.
  - S – Did not react with water at all

Based on the above observations answer the following :

49. Out of the given metals, the one which needs to be stored used Kerosene is
(a) P (b) R (c) S (d) Q

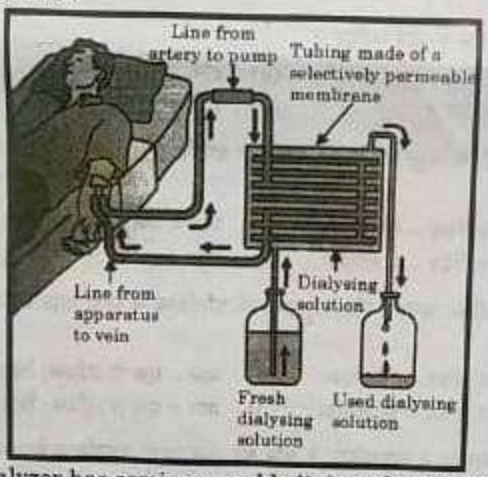
50. Out of the given metals, the metal Q is
(a) Iron (b) Zinc (c) Potassium (d) Magnesium

51. Metal which forms amphoteric oxides is
(a) P (b) Q (c) R (d) S

52. The increasing order of the reactivity of the four metals is;
(a) $P < Q < R < S$ (b) $S < R < Q < P$
(c) $S < P < Q < R$ (d) $P < R < Q < S$

Case-II :

The figure shown below represents a common type of dialysis called as Haemodialysis. It removes waste products from the blood. Such as excess salts, and urea which are insufficiently removed by the kidney in patients with kidney failure. During the procedure, the patient's blood is cleaned by filtration through a series of semi-permeable membranes before being returned to the blood of the patient. On the basis of this, answer the following questions :



53. The haemodialyzer has semi-permeable lining of tubes which help to :
(a) To maintain osmotic pressure of blood.
(b) To filter nitrogenous wastes from the dialyzing solution.
(c) In passing the waste products in the dialyzing solution.
(d) To pump purified blood back into the body of the patient.

54. Which one of the following is not a function of Artificial Kidney ?
(a) To remove nitrogenous wastes from the blood.
(b) To remove excess fluids from the blood.
(c) To reabsorb essential nutrients from the blood.
(d) To filter and purify the blood.

55. The 'used dialysing' solution is rich in;
(a) Urea and excess salts (b) Blood cells
(c) Lymph (d) Proteins

56. Which part of the nephron in human kidney, serves the function of reabsorption of certain substances ?
(a) Glomerulus (b) Bowmans Capsule
(c) Tubules (d) Collecting duct

Case-III :

A compound microscope is an instrument which consists of two lenses L_1 and L_2. The lens L_1 called objective, forms a real, inverted and magnified image of the given object. This serves as the object for the second lens L_2; the eye piece. The eye piece functions like a simple microscope or magnifier. It produces the final image, which is inverted with respect to the original object, enlarged and virtual.

57. What types of lenses must be L_1 and L_2 ?
(a) Both concave (b) Both convex
(c) L_1 – concave and L_2 – convex (d) L_1 – convex and L_2 – concave

58. What is the value and sign of magnification (according to the new Cartesian sign convention) of the image formed by L_1 ?
(a) Value = Less than 1 and Sign = Positive
(b) Value = More than 1 and Sign = Positive
(c) Value = Less than 1 and Sign = Negative
(d) Value = More than 1 and Sign = Negative

59. What is the value and sign of (according to new Cartesian sign convention) magnification of the image formed by L_2 ?
(a) Value = Less than 1 and Sign = Positive
(b) Value = More than 1 and Sign = Positive
(c) Value = Less than 1 and Sign = Negative
(d) Value = More than 1 and Sign = Negative

60. If power of the eyepiece (L_2) is 5 diopters and it forms an image at a distance of 80 cm from its optical centre, at what distance should the object be ?
(a) 12 cm (b) 16 cm (c) 18 cm (d) 20 cm