NATIONAL TEACHERS COUNCIL

NATIONAL LEVEL

SCIENCE OLYMPIAD

Class 10

Time Allowed: 90 Minutes   **Maximum Mark: 50**

This Test Booklet contains 12pages. Do not open the Test Booklet until you are asked to do so.

Important instructions

1. **The Answer Sheet is inside this Test Booklet.** *When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully with* **blue/black ball point pen.**

2. *The question paper is divided into two sections.* **Science** *(40 Questions) and* **Logical Reasoning** *(10 Questions)*

3. *All the two Sections contain Multiple Choice Questions (MCQs). Each of these questions has four options out of which only one option is correct.*

4. *Each question should be answered by* **darkening** *the appropriate circle (A, B, C, or D) with a* **blue or black ball pen.**

5. *All questions are compulsory. There is no negative marks for wrong answer.*

6. *Answer recorded once in the answer sheet cannot be altered.*

7. *All rough works should be done only in the space provided for* **rough work** *in this question paper.*

8. *Calculator is not permitted in the examination hall.*

9. *Candidate should write his / her name in the space provided for the purpose.*

Candidate's Name:

Roll Number   :

....
Candidate's Signature

....
Invigilator's Signature

SCIENCE

1 Which part of the human brain controls body temperature?

        [A] Pituitary   [B] Diencephalon

        [C] Hypothalamus   [D] None of these

2 The diagram below represents gametes P and Q fusing to give cell R. This cell then produces gametes S, T, U and V.

    Which statement about the number of chromosomes in the cells and gametes is correct.

        [A] The number of chromosomes in P and Q are different

        [B] The number of chromosomes in P and Q are same

        [C] The number of chromosome in S is one quarter of chromosomes in R

        [D] The number of chromosomes in T is half the number of chromosomes in Q

3 In natural selection,

        [A] The genetic composition of the population changes at random over time.

        [B] New mutations are generated over time.

        [C] All individuals in a population are equally likely to contribute offspring to the next generation.

        [D] Individuals that posse particular inherited characters survive and reproduce at a higher rate than other individuals

4 *Read the following statement of assertion and statement of reason carefully and select correct option.*

    Assertion: Ethnography is important for ecologist and gentians

    Reason: It helps in dealing with distribution of different races of mankind and eugenics.

        [A] Assertion is true and Reason is false

        [B] Assertion is false and Reason is true

        [C] Both Assertion and Reason are true and Reason is the correct explanation of Assertion

        [D] Both Assertion and Reason are true and Reason is not the correct explanation of Assertion

5   Observe the figure given below which represents the control of water concentration in the blood.
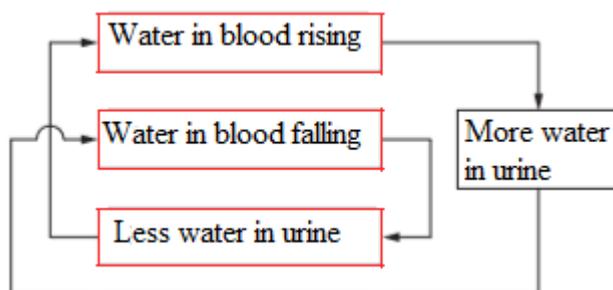
This is a negative feedback system because

    [A] It decreases the amount of water in the blood

    [B] It increases the amount of water in the blood

    [C] It reverses any change occuring in the amount of water in the blood

    [D] It increases any change occuring in the amount of water in the blood

6   The following graph shows the concentration of oxygen in a river, measured at stations 1 -5 each 100m apart. A sewage outflow is observed just after station 1. At which stations will the concentration of organic matter be lowest?
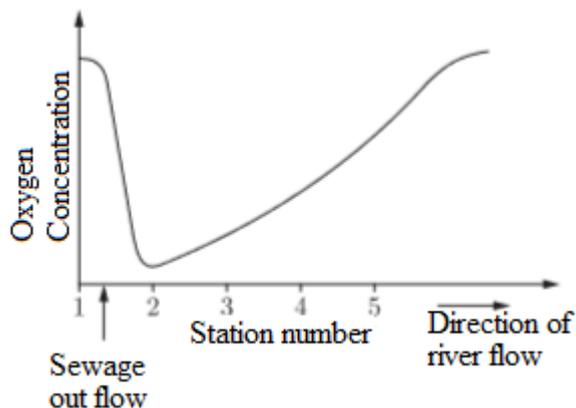
    [A] 1 and 5   [B] 2 and 3

    [C] 3 and 4   [D] 4 and 5

7   Under which condition stated below, the six carbon glucose molecule is broken down into three carbon molecules pyruvate and lactic acid?

    [A] Aerobic condition in muscle ells

    [B] Anaerobic condition in yeat cells

    [C] Anaerobic condition in muscle cells

    [D] Aerobic condition in mitochondria

8   Why does a food chain generally have not more than five trophic levels?

       [A] The loss of biodiversity has limited the variety of organisms.

       [B] There is no way to determine the upper trophic levels.

       [C] Many organisms have multiple food sources.

       [D] There is a loss of energy at each trophic level.

9   In a hypertensive patient, the systolic pressure increased to 150mm of Hg. Which part of the brain would be involved in the reguation of blood pressure?

       [A] Medulla   [B] Cerebrum

       [C] Cerebellum   [D] Hypothalamus

10   A couple has four children with different blood groups: A, B, AB and O. The blood groups of the parents are likely to be

       [A] A & A   [B] A & B

       [C] AB & O   [D] A & AB

11   A dilute solution of sodium carbonate was added to two test tubes – one containing dil. HCl [test tube P] and the other containing dil NaOH [test tube Q]. The correct observation is

       [A] A brown coloured gas liberated in test tube P

       [B] A brown coloured gas liberated in test tube Q

       [C] A colourless gas liberated in test tube P

       [D] A colourless gas liberated in test tube Q

12   You are having five solutions P, Q, R, S and T with pH values as follows

Solutions	P	Q	R	S	T
pH	1.8	7	8.5	8	5

Which solution would be most likely to liberate hydrogen with magnesium powder?

       [A] Solutions P and Q   [B] Solution P

       [C] Solution R   [D]All of the above

13   A student mistakenly used a wet gas jar to collect sulphur dioxide. Which one of the following tests of the gas is likely to fail?

       [A] Odour   [B] Effect on acidified $K_2Cr_2O_7$ solution

   [C] Solubility test   [D] None of these

14   An element belongs to group 17. It is present in third period and its atomic number is 17. What is the atomic number of the element belonging to same group and present in fifth period?

       [A] 53   [B] 35

       [C] 33   [D] 25

15 *Read the following statement of assertion and statement of reason carefully and select correct option.*

Assertion: Hydrogenation is the process of converting an oil into a fat, called vegetable ghee

Reason: Hydrogenation is carried out in presence of a catalyst usually finely divided nickel.

[A] Assertion is true and Reason is false

[B] Assertion is false and Reason is true

[C] Both Assertion and Reason are true and Reason is the correct explanation of Assertion

[D] Both Assertion and Reason are true and Reason is not the correct explanation of Assertion

16 The structures of three hydrocarbons are given below
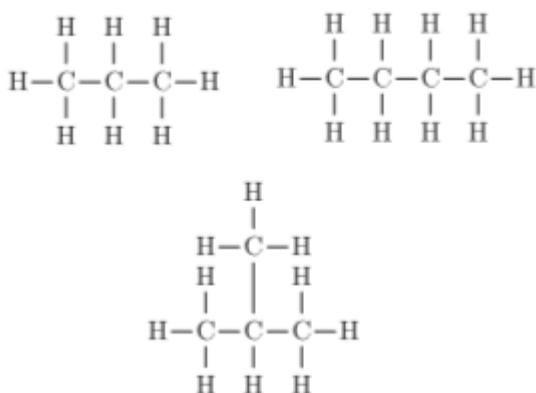
Which statement is correct for all the above three compounds?

[A] They are isomers of each other

[B] They have the same general formula

[C] They have the same physical properties

[D] They react with aqueous bromine

17 Choose the correct option which represents the oxides as

acidic : basic : neutral : amphoteric

I. $CO_2 : MgO : N_2O : H_2O$ II. $P_2O_5 : ZnO : NO : Al_2O_3$

III. $SO_2 : NO : CO : Al_2O_3$ IV. $SO_3 : CaO : N_2O : PbO$

[A] I & II   [B] II & III

[C] III & IV   [D] I & IV

18 Which of the following statements can help a chemistry student to predict chemical properties of an element?

$$I \rightarrow \textit{Position of an element in the periodic table}$$

$$II \rightarrow \textit{Atomic number of the element}$$

$$III \rightarrow \textit{Number of shells in the atom}$$

$$IV \rightarrow \textit{Number of electrons in the outermost shell}$$

[A] I, II & III   [B] I, II & IV

[C] I, II & IV   [D] II, III & IV

19 The elements F, Cl, Br and I belong to the same group of the periodic table. The correct order of their reactivity is

[A] F < Cl < Br < I   [B] F > I > Br > Cl

[C] F > Cl > Br > I   [D] F = Cl < Br < Cl

20 Which of the following statement is correct?

I. German silver is an alloy of silver, copper and zinc

II. There is no zinc in brass

III.   Bronze is an alloy of copper and tin

[A] I, II and III   [B] only III

[C] only II   [D] only I and II

21 One mole of a hydrocarbon X reacted completely with one mole of hydrogen gas in the presence of a heated catalyst.

What would be the formula of X?

[A] C_2H_6 [B] C_6H_{10}

[C] C_3H_8 [D] C_7H_{16}

22 A compound **P** when treated with a dilute mineral acid gives a gas which when passed through a solution of **Q** regenerates **P**. Further, a gas **R** that is obtained from the addition of concentrated HCl to $KMnO_4$ crystals is used to react with **Q** to give **S**. Identify **P**, Q, **R** and **S**

	P	**Q**	**R**	**S**
[A]	$CaCO_3$	$Ca(OH)_2$	Cl_2	$CaOCl_2$
[B]	Na_2CO_3	NaOH	O_2	Na_2O
[C]	$MgCO_3$	$Mg(OH)_2$	OCl_2	$Mg(OCl)_2$
[D]	$Al_2(CO3)_3$	$Al(OH)_3$	Cl_2	Al_2O_3

23 Bleaching powder gives smell of chlorine because it

  [A] Is unstable

  [B] Gives chlorine on exposure to atmosphere

  [C] Is a mixture of chlorine and slaked lime

  [D] Contains excess of chlorine

24 Metals are refined by using different methods. Which of the following metals are refined by electrolytic refining?

   1. Gold   *2. Copper*   *3. Sodium*   *4. Potassium*

  [A] 1 and 2   [B] 1 and 3

  [C] 2 and 3   [D] 2 and 4

25 The final product of chlorination of methane in the sunlight is

  [A] CH_3Cl [B] CH_2Cl_2

 [C] $CHCl_3$ [D] CCl_4

26 The refractive index of dens flint glass is 1.65 and for alcohol, it is 1.36 with respect to air. The refractive index of the dens flint glass with respect to alcohol is

  [A] 1.31   [B] 1.21

  [C] 1.11   [D] 1.01

27 A convex lens A of focal length 20 cm and a concave lens B of focal length 5 cm are kept along the same axis with a distance **d** between them. If a parallel beam of light falling on A leaves B as a parallel beam, then the distance d in cm will be

  [A] 50   [B] 30

  [C] 25   [D] 15

28 A prism ABC (with BC as base) is placed in different orientations. A narrow beam of white light is incident on the prism as shown in figure. In which of the following cases, after dispersion, the sixth colour from the top corresponds to the colour of the sun?
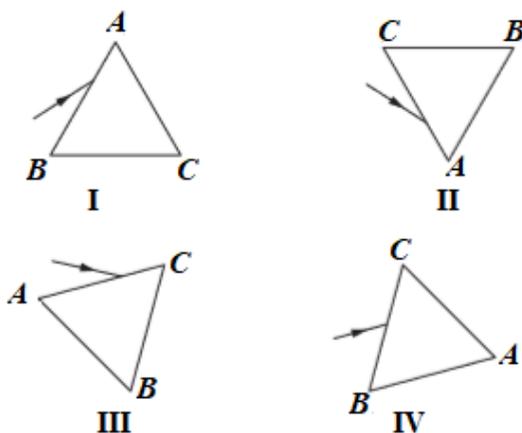
  [A] I   [B] II

  [C] III   [D] IV

29 Three resistances 2Ω, 3Ω and 5Ω are connected in parallel to a 10V battery of negligible internal resistance. The potential difference across the 3Ω resistance will be

      [A] 2 V   [B] 3 V

      [C] 5 V   [D] 10 V

30 Two convex lenses A and B, each of focal length 30cm are separated by 30cm as shown the figure below. An object O is placed at a distance of 40cm to left of lens A
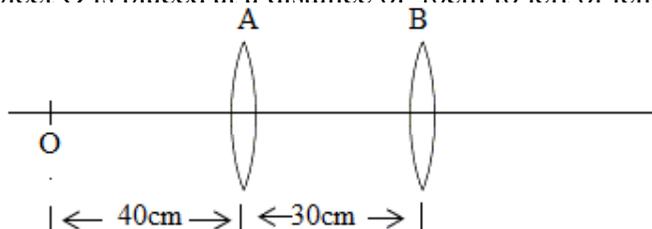
      What is the distance of the final image formed by this lens system?

      [A] 120cm to right of lens A   [B] 90cm to right of lens A

      [C] 22.5 cm to right of lens B   [D] 45.5 cm to right of lens B

31 A tube light draws 10W when connected to a 12 V supply. How will its resistance change when it is connected to a 6 V supply?

      [A] It becomes half   [B] It doubles

      [C] It become one fourth   [D] It remains the same

32 Two nichrome wires A and B, each of length 5cm and of radius 1cm and 3cm respectively are connected to each other in series. If a current of 5A flows through the combination of wires, the ratio of potential difference across wire A to that across wire B will be

      [A] 1 : 3   [B] 3 : 1

      [C] 9 : 1   [D] 1 : 9

33 If x, y, z denotes object distance, image distance and focal length in case of a mirror respectively, then the correct relation in connecting these parameters is

      [A] $z = \dfrac{xy}{x+y}$ [B] $z = \dfrac{x+y}{xy}$

      [C] $z = \dfrac{xy}{x-y}$ [D] $x = \dfrac{zy}{x+y}$

34 Solar energy is the universal source of energy. It is converted into chemical energy by

      [A] Solar cooker   [B] Green plants

      [C] Photovoltaic cells   [D] Solar concentrators

35 A bar magnet is placed near a circular loop of copper wire such that the axis of the magnet (x-axis in the diagram below) is perpendicular to the plane the loop and passes through its centre, as shown below.
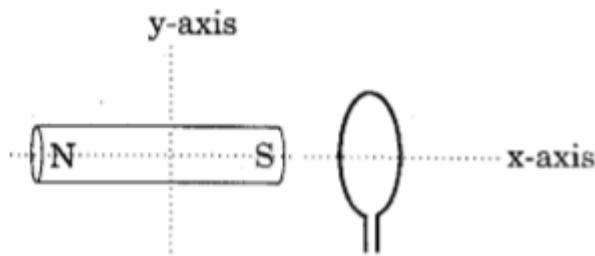
Four independent motions of the magnet and the loop are performed.

1. The magnet is moved along the x-axis towards the loop at a speed of v, keeping the loop still.

2. Both the magnet and loop are moved in the same direction along the x-axis at a speed v.

3. The loop is rotated about the x-axis, keeping the magnet still.

4. The magnet is rotated about the y-axis, keeping the loop still.

For which of the above motions will e.m.f be induced in the circular loop?

[A] Only 1 and 2   [B] Only 1 and 4

[C] Only 1, 2 and 4   [D] Only 3 and 4

36 Which of the following determines the direction of magnetic field due to a current carrying conductor?

[A] Faraday's law of electromagnetic induction

[B] Fleming's left-hand rule

[C] Lenz's rule

[D] Maxwell's cork screw-rule

37 *Read the following statement of assertion and statement of reason carefully and select correct option.*

Assertion: Longer wires have greater resistance and the smaller wires have lesser resistance

Reason: Resistance is inversely proportional to the length of the wire.

[A] Assertion is true and Reason is false

[B] Assertion is false and Reason is true

[C] Both Assertion and Reason are true and Reason is the correct explanation of Assertion

[D] Both Assertion and Reason are true and Reason is not the correct explanation of Assertion

38 Two cells of 3 V each are connected in parallel. An external resistance of 0.5Ω is connected in series to the junction of two parallel resistors of 4Ω and 2Ω and then to common terminal of battery through each resistor as shown in figure. What is the current flowing through 4Ω resistor?
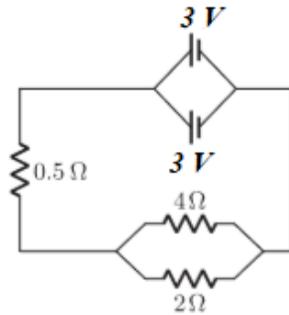
[A] 0.25 A   [B] 0.35 A

[C] 0.55 A   [D] 1.50 A

39 A glass slab is placed over a page on which the word **VIBGYOR** is printed with each letter in corresponding colour. Then, which of the following is correct?

[A] The images of all the letters will be in the same place as that on paper

[B] Letter V is raised more

[C] Letter R is raised more

[D] None of the above

40 To avoid risk of electrical shock, which of the following is used?

[A] Over loading   [B] Short circuiting

[C] Earthing   [D] None of these

## LOGICAL REASONING

41 Fid the odd one out

[A] Headmaster   [B] Principal

[C] Teacher   [D] Lecturer

42 Which letter will replace the question mark (?) in the following?
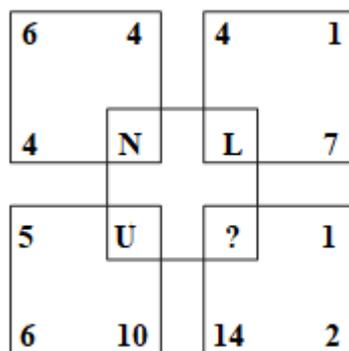
[A] Q

[B] M

[C] R

[D] S

43 Find out from amongst the four alternatives as to how the pattern would appear when the transparent sheet is folded at the dotted line.
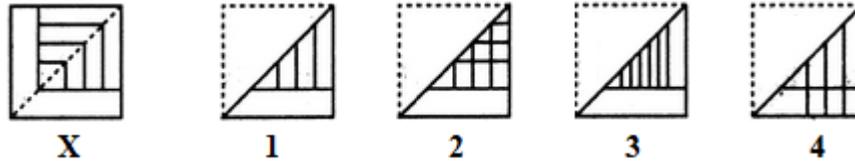
[A] 1   [B] 2

[C] 3   [D] 4

44 Which one will replace the question mark?
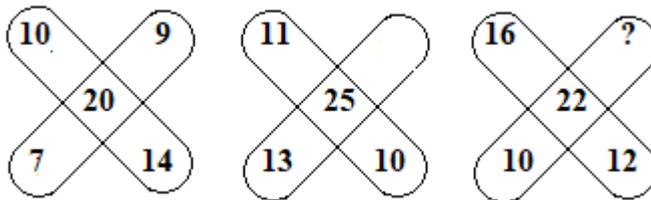
[A] 6   [B] 7

[C] 8   [D] 9

45 In a school, there were five teachers.
        A and B were teaching Hindi and English.
        C and D were teaching English and Geography.
        D and A were teaching Mathematics and Hindi
        E and B were teaching History and French.

Who among the teachers was teaching maximum number of subjects?

[A] B   [B] C

[C] A   [D] D

46 *In the following question contains a small paragraph followed by a question on it. Read the paragraph carefully and answer the question given below it.*

Though the waste of time or the expenditure on fashions is very large, yet fashions have come to stay. They will not go, come what may. However, what is now required is that strong efforts should be made to displace the excessive craze for fashion from the minds of these youngsters.

The passage best supports the statement that:

        [A] Fashion is the need of the day.

        [B] The excessive craze for fashion is detrimental to one's personality.

        [C] The hoard for fashion should be done away with so as not to let down the constructive development.

        [D] Work and other activities should be valued more than the outward appearance.

47 Pointing to an old man, Kailash said, "*His son is my son's uncle*." How is the old man related to Kailash?

　　　　[A] Brother　　　　　　　　　　[B] Uncle

　　　　[C] Father　　　　　　　　　　　[D] Grandfather

48 Identify the figure that completes the pattern.
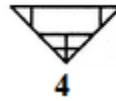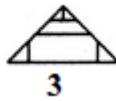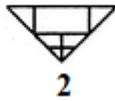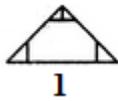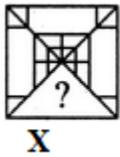
　　　　[A] 1　　　　　　　　　　　　　[B] 2

　　　　[C] 3　　　　　　　　　　　　　[D] 4

49 Use the diagram below to answer the question that follows.
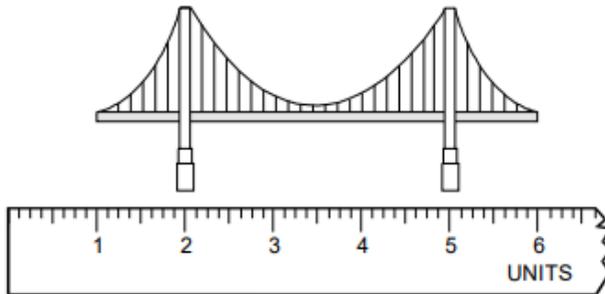
If the actual length of the bridge is 4200 feet, then what is the scale of the diagram of the bridge?

　　　　[A] 1 unit = 700 feet　　　　　　[B] 1 unit = 763.6 feet

　　　　[C] 1 unit = 840 feet　　　　　　[D] 1 unit = 933.3 feet

50 Four gears are shown in the figure below
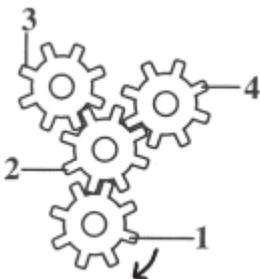
If gear 1 is turn as shown, then which of the following gears are turning in the same direction?

　　　　[A] 2 and 4

　　　　[B] 2 and 3

　　　　[C] 3 and 4

　　　　[D] 2, and 4