



INTSO EDUCATION

SCIENCE TALENT SEARCH OLYMPIAD (STSO) 2015-16

STAGE - 2

TIME : 60 min.

CLASS : X

Max. Marks : 50

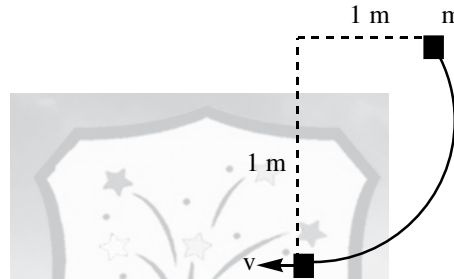
Instructions:

- ⇒ Fill the OMR sheet completely and carefully.
- ⇒ Each question carries one mark and has only one correct answer. $\frac{1}{4}$ (one fourth) marks will be deducted for indicating incorrect response of each question.
- ⇒ The question paper contains 50 questions to be answered in 60 minutes.

PHYSICS

1. A block of mass 1 kg slides down a curved track which forms one quadrant of a circle of radius 1 m, as shown in figure. The speed of block at the bottom of the track is $v = 2 \text{ ms}^{-1}$. The work done by the force of friction is []

- 1) + 4J
- 2) - 4J
- 3) - 8 J
- 4) + 8J

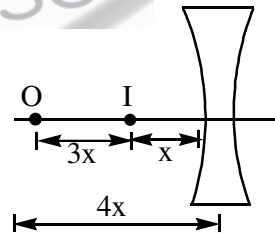


2. A professor reads a greeting card received on his 50 th birthday with + 2.5 D glasses keeping the card 25 cm away. Ten years later, he reads his farewell letters with the same glasses but he has to keep the letters 50 cm away. What power of lens should he now use ? []

- 1) - 2.5 D
- 2) + 2 D
- 3) - 4.5 D
- 4) + 4.5 D

3. A concave lens forms the image of an object such that the distance between the object and image is 10 cm and the magnification produced is $\frac{1}{4}$. The focal length of the lens will be []

- 1) 8.6 cm
- 2) 6.2 cm
- 3) 10 cm
- 4) 4.4 cm

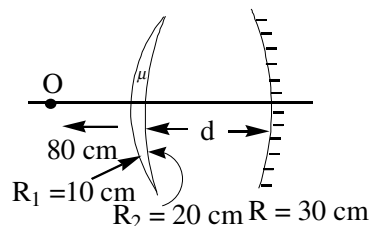


4. A paperweight in the form of a hemisphere of radius 3 cm is used to hold down a printed page (plain surface down). An observer looks at the page vertically through the paper weight. At what height above the page will the printed letters near the centre appear to the observer ? ($\mu_{\text{glass}} = 1.5$)

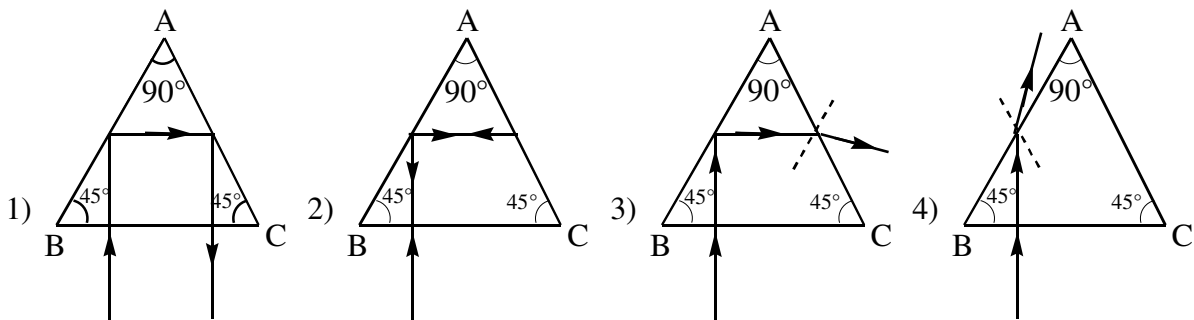
- 1) 0 cm
- 2) 1 cm
- 3) 2 cm
- 4) 1.5 cm []

5. If final image after two refractions through the lens and one reflection from the mirror forms at the same point O. Refractive index of the material of the lens $\mu = \frac{3}{2}$. Then the value of 'd' is .

- 1) 100 cm
- 2) 110 cm
- 3) 80 cm
- 4) 105 cm



6. The refractive index of material of a prism of angles 45° , -45° , and -90° is 1.5. The path of the ray of light incident normally on the hypotenuse side is shown in []

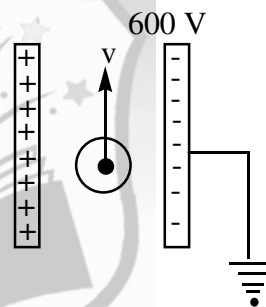


7. A proton of energy 8 eV is moving in a circular path in a uniform magnetic field. The energy of an α - particle moving in the same magnetic field and along the same path will be []
 1) 4 eV 2) 2 eV 3) 8 eV 4) 6 eV

8. A potential difference of 600 V is applied across the plates of a parallel plate condenser placed in a magnetic field. The separation between the plates is 3 mm. An electron projected vertically upward parallel to the plates with a velocity of 2×10^6 m/s moves undeflected between the plates. The magnitude and direction of the magnetic field in the region between the condenser plates will be (in Wb/m²) []

(Given, charge of electron = -1.6×10^{-19} C)

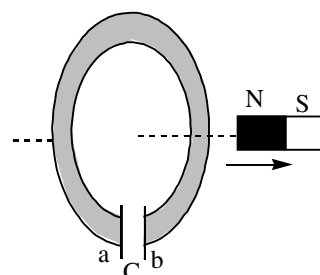
- 1) 0.1 vertically downward
 2) 0.2 vertically downward
 3) 0.3 vertically upward
 4) 0.4 vertically downward



9. A rectangular coil of size 10 cm \times 20 cm has 60 turns. It is rotating in a magnetic field of 0.5 Wb/m² at a rate of 1800 rev/min. The maximum induced emf across the ends of the coil is []
 1) 111 V 2) 112 V 3) 113 V 4) 114 V

10. Consider the arrangement shown in figure in which in the North pole of a magnet is moved away from a thick conducting loop containing capacitor. Then excess positive charge will arrive on []

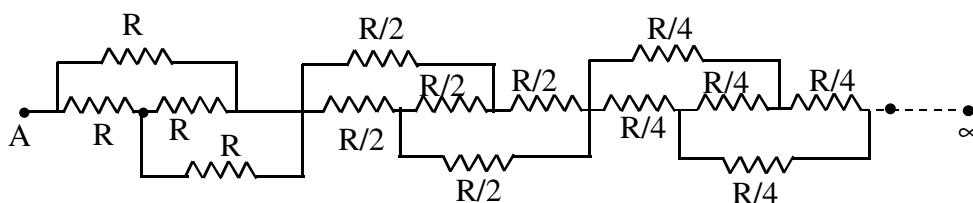
- 1) plate a
 2) plate b
 3) both plates a and b
 4) neither a nor b plates



11. The current changes in an inductance coil of 100mH from 100mA to zero in 2 ms. The emf induced in the coil will be []
 1) - 5 V 2) 5 V 3) - 50 V 4) 50 V

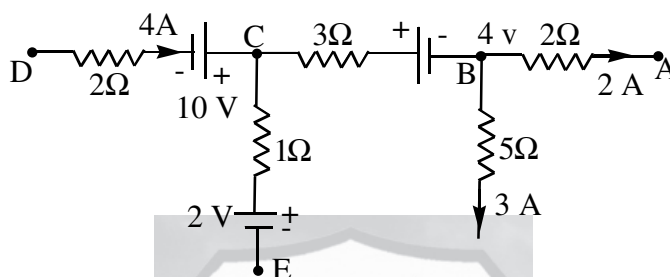
12. When a small piece of wire passes between the magnetic poles of a horse - shoe magnet in 0.1 s, emf of 4×10^{-3} V is induced in it. The magnetic flux between the poles is []
 1) 4×10^{-2} Wb 2) 4×10^{-3} Wb 3) 4×10^{-4} Wb 4) 4×10^{-6} Wb

13. Consider given network of resistances. If equivalent resistance of circuit is nR then, then the value of n may be []



- 1) 2 2) $\frac{1}{2}$ 3) 2 4) 3

14. Potential difference between points C and E is []



- 1) 1V 2) 2V 3) 5V 4) 0V

15. In a large building, there are 15 bulbs of 40W, 5 bulbs of 100W, 5 fans of 80 W and 1 heater of 1 kW. The voltage of the electric mains is 220 V. Then, the minimum current carrying capacity of fuse should be []

- 1) 8A 2) 10 A 3) 12 A 4) 14 A

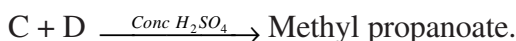
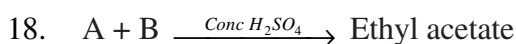
16. A body starts from rest and move with uniform acceleration. What is the ratio of kinetic energies at the end of 1 st, 2 nd and 3 rd seconds of its journey ? []

- 1) 1 : 8 : 27 2) 1 : 2 : 3 3) 1 : 4 : 9 4) 3 : 2 : 1

17. A crane can lift up 10, 000 kg of coal in 1 hour from a mine of 180 m depth. If the efficiency of the crane is 80 % , its input power must be ($g = 10 \text{ ms}^{-2}$) []

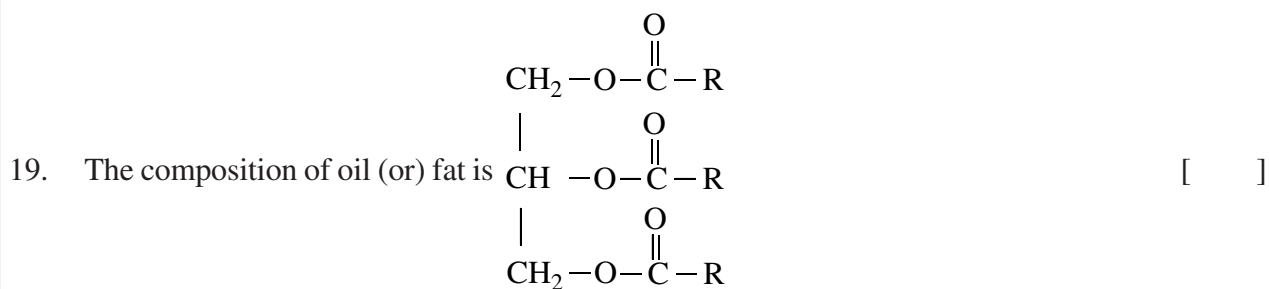
- 1) 5 kW 2) 6.25 kW 3) 50 kW 4) 62.5 kW

CHEMISTRY



In the above two reactions. A and C are carboxylic acids where as B and D are alcohols. Based on this, select the correct statements from the following []

- | | |
|---------------------------------------|--------------------------------------|
| a) IUPAC name of 'A' is ethanoic acid | b) IUPAC name of 'B' is ethanol |
| c) A = C and B = D | d) Common name of 'C' is formic acid |
| 1) All are correct | 2) Only a, b and d are correct |
| 3) Only a and b are correct | 4) Only a, b, c are correct |



Select the incorrect set from the following regarding 'R' is

	Oil	Fat		Oil	Fat
1)	$\text{C}_{17}\text{H}_{33}$	$\text{C}_{17}\text{H}_{35}$	2)	$\text{C}_{17}\text{H}_{29}$	$\text{C}_{11}\text{H}_{23}$
3)	$\text{C}_{15}\text{H}_{29}$	$\text{C}_{15}\text{H}_{31}$	4)	$\text{C}_{15}\text{H}_{31}$	$\text{C}_{17}\text{H}_{33}$

20. Which of the following is disadvantage of detergents over soaps. []

- 1) Detergents form scum with hard water 2) Some detergents are non biodegradable.
3) Detergents can not form micelles with water 4) All of these

21. While cooking, if the bottom of the vessel is getting blackened on outside, it means that []

- 1) Food is not cooked completely 2) Incomplete burning of fuel
3) Fuel is wet 4) Cooking utensil is wet

22. In winter season, a compound 'X' forms ice like flakes. IUPAC name of the compound is

- 1) Ethanoic acid 2) Propanone []
3) Ethanal 4) Ethyl ethanoate

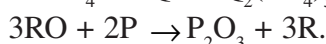
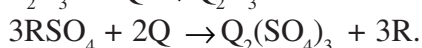
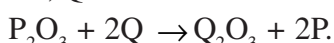
23.
$$\text{A} \xrightarrow{\text{ConcH}_2\text{SO}_4} \text{B} \xrightarrow[\text{Ni}]{\text{H}_2} \text{X} \xrightarrow[\text{O}_2]{\text{Combustion}} 2\text{CO}_2 + 3\text{H}_2\text{O}$$
 []

- a) 'B' is the first member of alkynes b) 'X' is the first member of alkanes
c) 90% of 'A' is called rectified spirit d) Secondary suffix of the compound 'A' is 'al'

Incorrect set among the following is

- 1) All are in correct 2) a, b and d 3) Only C 4) Only b and d

24. 'P', Q and 'R' are 3 elements which undergo chemical reactions according to following equations.



Based on the above equations, select the incorrect statement from the following is []

- 1) Q can acts as oxidising agent
2) P_2O_3 acts as oxidising agent
3) Compound of 'R' cannot act as reducing agent
4) Q cannot undergo reduction.

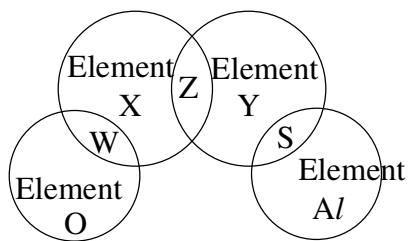
25. IUPAC name of a compound 'X' is propadiene. In the compound X []

- 1) Two σ_{sp-sp^2} bonds are present
2) 4 σ_{sp^2-s} bonds are present
3) The ratio of total number of hybrid orbitals and pure orbitals present in the compound 'X' is
4) All of these are correct

26. Formula of chloride of an element 'A' is ACl_3 . Formula of sulphate of another element 'B' is B_2SO_4 . The ratio of the valency of 'B' to 'A' is []

- 1) $\frac{1}{3}$ 2) 3 3) $\frac{3}{2}$ 4) $\frac{2}{3}$

27.



Number of protons in dipositive ion of X is 12. Where as number of protons in uninegative ion of 'Y' is 17. 'Z' is the compound formed by 'X' and 'Y'. The correct set of formula of W, Z, and S respectively are []

- | | W | Z | S |
|----|-------------------------------|------------------|-------------------|
| 1) | XO | YX ₂ | AlY |
| 2) | XO ₂ | XY | AlY ₂ |
| 3) | XO | XY ₂ | AlY ₃ |
| 4) | X ₂ O ₂ | X ₃ Y | Al ₂ Y |

28. **Column - I**

- a) Ethane
b) Ethylene
c) Acetylene
d) Benzene

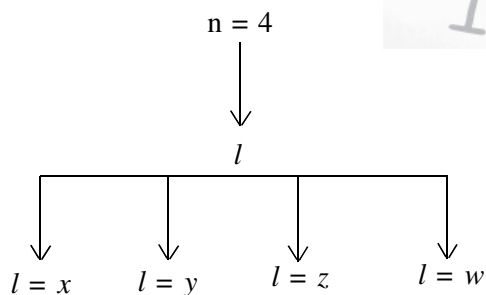
- | | a | b | c | d |
|----|---|---|---|---|
| 1) | p | r | q | p |
| 3) | r | p | q | s |

Column - II

- p) Tetrahedral hybridisation
q) Linear hybridisation
r) Trigonal planar hybridisation
s) No hybridisation

- | | a | b | c | d |
|----|---|---|---|---|
| 2) | p | r | q | r |
| 4) | q | p | s | r |

29. 'n' is principal quantum number, 'l' is azimuthal quantum number and 'm' is the magnetic quantum number



Value of W is X + Z. Value of Y is W - X - Y.

	$l = x$	$l = y$	$l = z$	$l = w$
Maximum value of m is	A	B	C	D
Minimum value of m	P	Q	R	S

Select the correct one from the following.

- 1) A = W + Z 2) B = Q 3) R = W - Z 4) D = W + X

30. 2s, 3s and 4s orbitals are differ in their []
 a) size b) energy c) shape
 d) number of nodal regions e) number of nodal planes
 1) All of these 2) a, c, e 3) a, b, d 4) c, e
31. $xM + yH_2O \rightarrow zS_{(aq)} + wG \uparrow$.
 Aqueous solution of S turns red litmus to blue. Gas G is combustible but not supporter of combustion. Metal M has low melting point and is used as coolant in nuclear reactor. Select the incorrect one form the following. []
 1) $x = y = z$ and $2w = z$
 2) Solution 'S' is NaOH
 3) Metal 'M' is present in IA group and 4th period.
 4) Metal 'M' is present in between K and Ca in the reactivity series.
32. Among the following aqueous solutions, the number of Solutions with $pH < 7$, $pH > 7$ and $pH = 7$ respectively are. Na_2CO_3 , NaCl, NH_4Cl , CH_3COONa , K_2SO_4 , $(NH_4)_2SO_4$ []
 1) 2, 2, 2 2) 2, 3, 1 3) 1, 3, 2 4) 4, 2, 0
33. Amount of glucose required for releasing of 22.4 lit of CO_2 at STP during respiration process is
 1) 180g 2) 90g 3) 30g 4) 15g []
34. Corrosion of metals can be useful in which of the following case []
 1) Fe 2) Al 3) Stainless steel 4) Ag
- BIOLOGY**
35. Identify the teeth which are absent in infants []
 1) Incisors 2) Canines 3) Premolars 4) Molars
36. Photosynthesis is maximum in []
 1) Blue light followed by red light 2) Red light followed by Blue light
 3) Green light 4) Red light
37. Diffusion of gases along the respiratory surface occurs because []
 1) P_{CO_2} is more in alveoli than blood 2) P_{O_2} is more in alveoli than blood
 3) P_{CO_2} is more in blood than in tissues 4) P_{O_2} is more in blood than in tissues
38. Identify the incorrect pair []
 1) Cockroach : Trachel respiration
 2) Fish : Bronchial respiration
 3) Man : Pulmonary respiration
 4) Earthworm : Cutaneous respiration
39. Identify the blood vessel with the following characters []
 i) carries oxygenated blood ii) walls are thin
 iii) carries blood towards the heart
 1) Jugular vein 2) Pulmonary artery 3) Coronary artery 4) Pulmonary vein
40. The lymphatic system []
 1) Removes excess fluids from body tissues
 2) Absorbs fats and transports them to the cardiovascular system
 3) Produces certian types of white blood cells
 4) All of the above

41. The rate of transpiration of a plant would gradually increase if []
 1) The relative humidity increases
 2) The relative humidity decreases
 3) Water holding capacity of air increases
 4) Water holding capacity of air decreases
42. Identify the function of vasopressin []
 1) Maintains osmotic concentration of body fluids
 2) Thermo regulation
 3) Glucose metabolism
 4) Control of thyroid gland
43. Study the following list and pick the correct match. []
 A) Annelids I) Meta nephridia
 B) Protozoa II) Water Vascular System
 C) Mollusca III) Nephridia
 D) Echinodermata IV) Simple diffusion
 V) Kidney
- | | A | B | C | D | | A | B | C | D |
|----|-----|---|-----|----|----|-----|----|---|----|
| 1) | III | I | II | V | 2) | III | IV | I | II |
| 3) | IV | I | III | II | 4) | II | IV | V | I |
44. Feed back mechanism controls : []
 1) Nervous system
 2) Enzyme production
 3) Time and amount by hormones released by endocrine glands
 4) Salivation
45. During water stress, the closure of stomata is due to the following phytohormone []
 1) Abscissic acid 2) Gibberellin 3) Ethylene 4) Cytokinin
46. Match the following : []
 A) Cerebrum i) Maintains posture
 B) Diencephalon ii) Various activities
 C) Cerebellum iii) Centre for water balance
 D) Medulla oblongata iv) Reflexes for sight and hearing
 v) Interpret sensations
- 1) A - i, B - iii, C - iv, D - ii
 2) A - v, B - iii, C - i, D - ii
 3) A - iii, B - ii, C - i, D - v
 4) A - ii, B - i, C - iii, D - iv
47. Which of the following hormones stimulates the contraction of uterus at the time of parturition []
 1) oxytocin 2) progesterone 3) oestrogen 4) hcG
48. Gonorrhoea is caused by []
 1) Bacteria 2) Virus 3) Fungai 4) Protozoa
49. The part of male reproductive system which stores sperms temporarily is []
 1) vasdeferens 2) vassefferentia 3) epididymis 4) seminiferous tubules
50. Expand ASHA []
 1) Accredited Social Health Activist 2) Accredited Social Health Association
 3) Advanced Social Health Activist 4) Accredited Safe Health Association

