INVENTORS™ Education Pvt. Ltd.

JEE | NEET | NTSE | KVPY | OLYMPIADS

[I S A T]

[INVENTORS SCHOLARSHIP CUM ABILITY TEST]

SAMPLE PAPER

[STREAM : MEDICAL]

TIME : 2 Hours | **FULL MARKS : 320**

INSTRUCTIONS

[A] General

1. This Question paper contains FOUR Parts, A to D (Physics, Chemistry, Mathematics and Mental Ability).
2. This Question Paper contains 20 pages including cover page.
3. This question paper contains total 80 questions (20 questions each in Physics, Chemistry, Mathematics and Mental Ability).
4. The Question Paper has blank spaces at the bottom of each page for rough work. No additional sheets will be provided for rough work.
5. Blank papers, clip boards, log tables, slide rule, calculators, cellular phones, pagers and electronic gadgets, in any form, are NOT allowed.
6. The OMR (Optical Mark Recognition) sheet shall be provided separately.

[B] Answering on the OMR

7. In all the parts, each question will have 4 choices out of which only one choice is correct.
8. Darken the bubble with Ball Pen (Blue or Black) ONLY.

[C] Filling OMR

9. On the OMR sheet, fill all the details properly and completely, otherwise your OMR will not be checked.
10. Do not write anything or tamper the barcode in the registration no. box.

[D] Marking Scheme:

11. For each question you will be awarded 3 marks if you darken the bubble corresponding to the correct answer ONLY and zero (0) marks if no bubble is darkened. In all other cases, minus one (–1) mark will be awarded.

Name :.....

Registration No.: ☐☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐

SECTION – A : PHYSICS

1. A child walks towards a fixed plane mirror at a speed of 5 km h^{-1}. The velocity of the image with respect to mirror is -

(A) 5 km h^{-1} (B) –5 km h^{-1} (C) 10 km h^{-1} (D) –10 km h^{-1}

2. Two plane mirrors are inclined to one another at an angle of 40°. A point object is placed in between them. The number of images formed due to reflection at both mirrors is-

(A) Infinite (B) 9 (C) 8 (D) 6

3. Two plane mirrors are kept at an angle α. A light ray striking the two mirrors successively suffers a deviation of $5\pi/6$. The value of α is –

(A) $\frac{\pi}{9}$ (B) $\frac{7\pi}{12}$ (C) $\frac{3\pi}{5}$ (D) $\frac{9\pi}{11}$

4. How will the image formed by a convex lens be affected, if the central portion of the lens is wrapped in black paper, as shown in the fig.

(A) No image will be formed

(B) Full image will be formed but it is less bright

(C) Full image will be formed but without the central portion

(D) Two images will be formed, one dur to each exposed half.

5. Two thin lenses of focal lengths f_1 and f_2 are placed in contact with each other. The focal length of the combination will be given by.

(A) $\frac{f_1 f_2}{f_1 - f_2}$ (B) $\sqrt{f_1 f_2}$

(C) $\frac{f_1 f_2}{f_1 + f_2}$ (D) $\frac{f_1 + f_2}{2}$

Space for Rough Work

6. A virtual image of an object is formed by a concave lens. The lens is then coupled (placed in contact) with a convex lens. A virtual image is again formed. The image, now

(A) Remains in the original position

(B) Shifts towards the lens system

(C) Shifts away from the lens system

(D) Either shifts toward or away from the lens system, depending on whether, the convex or the concave lens faces the object.

7. The length of an astronomical telescope for the normal adjustment is-

(A) $f_0 \times f_e$ (B) $f_0 + f_e$ (C) $\frac{f_0}{f_e}$ (D) $\frac{f_0 f_e}{f_0 + f_e}$

8. The distinction between conductors, insulators and semiconductor is largely concerned with

(A) their ability to conduct current

(B) the type of crystal lattice

(C) binding energy of their electrons

(D) relative widths of their energy gaps

9. A cylindrical conductor is placed near another positively charged conductor. The net charge acquired by the cylindrical conductor will be.

(A) positive only (B) negative only

(C) zero (D) either positive or negative

10. A negative charge released from a point A moves along the line AB. The potential at A is 15 V, and it varies uniformly along AB. The potential at B.

(A) may be 10 V (B) may be 15 V

(C) may be 20 V (D) must be 15 V

11. For which of the following substances does resistance decrease with increase in temperature?

(A) Copper (B) Mercury

(C) Carbon (D) Platinum

Space for Rough Work

12. If a charge of 12.5 nC flows in 50 ms, the current flowing is-

(A) 2.5×10^{-7} A (B) 6.25×10^{-7} A

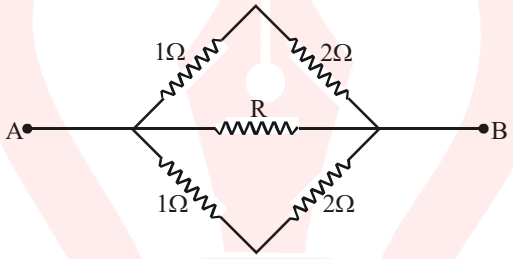
(C) 2.5×10^{-5}A (D) 625 A

13. Three resistances each of 4 Ω are connected in the form of an equilateral triangle. The effective resistance between any two corners is.

(A) (3/8) Ω (B) (8/3) Ω

(C) 8 Ω (D) 12 Ω

14. The equivalent resistance between points A and B in the fig, is 1 Ω. What is the value of unknown resistance R?



(A) 1 Ω (B) 3 Ω

(C) 6 Ω (D) 9 Ω

15. Find the power wasted in the transmission cables of resistances 0.05 ohm when 10 k W is transmitted at 200 volts –

(A) 0.0125 k W (B) 0.125 k W

(C) 25 k W (D) 37.5 k W

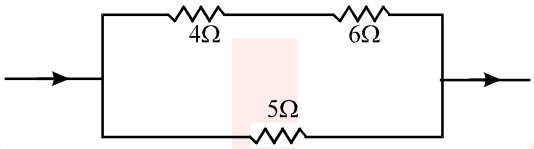
16. If two heaters of each power 1 kW are connected in parallel to a 250V supply their combined rate for heating will be –

(A) 2000 W (B) 1000 W

(C) 5000 W (D) 250 W

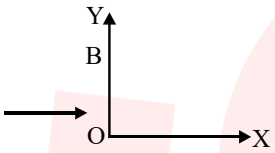
Space for Rough Work

17. In a circuit shown in fig. the heat produced in 5Ω resistor due to a current flowing in it is 10cal/s. The heat produced in 4Ω resistor is



(A) 4 cal/s (B) 1 cal/s (C) 2 cal/s (D) 3 cal/s

18. If a positively changed particle is moving as shown in the figure, then it will get deflected out to magnetic field towards



(A) +x–direction (B) +y-direction (C) –x-direction (D) +z-direction

19. An electron enters a magnetic field along perpendicular direction. Following quantity will remain constant-

(A) Momentum (B) Kinetic energy

(C) Velocity (D) Acceleration

20. In a dc motor, induced e.m.f. will be maximum –

(A) When motor takes maximum speed

(B) When motor starts rotating

(C) When speed of motor increases

(D) When motor is witched off

Space for Rough Work

SECTION – B : CHEMISTRY

21. Combination of phosphorus and oxygen is an example of

(A) oxidation (B) reduction (C) rancidity (D) none of these

22. Neutralization reaction is an example of -

(A) exothermic reaction (B) endothermic reaction

(C) oxidation (D) none of these

23. In the reaction $xPb(NO_3)_2 \xrightarrow{Heat} yPbO + zNO_2 + O_2$ x,y and z are -

(A) 1,1,2 (B) 2,2,4 (C) 1,2,4 (D) 4,2,2

24. Soda-acid fire extinguisher extinguishes the fire by

(A) Cutting the supply of air (B) Removing the combustible substance

(C) Raising the ignition temperature (D) None of these

25. Why should Plaster of Paris be stored in a moisture proof container?

(A) On mixing with water it changes into a hard solid

(B) On mixing with water it becomes diluted

(C) It evaporates in moisture

(D) It breaks into its component in water.

26. 'Alum' is an example of

(A) Single salt (B) Double salt (C) Acids (D) None of these

27. Copper sulphate solution can be safely kept in a container made of

(A) Aluminium (B) Lead (C) Silver (D) Zinc

28. Which of the following statements is not correct?

(A) All metals are solid at room temperature.

(B) All metals are good conductors of heat and electricity.

(C) All metals form basic oxides.

(D) All metals possess luster when freshly prepared.

Space for Rough Work

29. Which of the following metals form amphoteric oxide?

(A) Copper (B) Silver (C) Aluminium (D) Iron

30. The by-product of soap industry is

(A) Glycerol (B) Glycol (C) Isoprene (D) Acid

31. When the stopper of a bottle containing a colourless liquid was removed, it gave out smell like that of vinegar. The liquid in the bottle could be

(A) Hydrochloric acid (B) Sodium hydroxide solution

(C) Acetic acid solution (D) Sodium carbonate solution

32. What is observed when acetic acid and sodium bicarbonate solution are mixed?

(A) A colourless odourless gas is liberated

(B) A colourless gas that turns blue litmus red.

(C) A colourless gas which burns with a pop sound.

(D) Both (A) and (B).

33. Which of the following decreases in going down the halogen group?

(A) Ionic radius (B) Atomic radius

(C) Ionisation energy (D) Boiling point

34. Gradual addition of electronic shells in the noble gases causes a decrease in their

(A) Ionisation energy (B) Atomic radius

(C) Boiling point (D) Density

35. Why are the elements lithium, sodium and potassium called alkali metals?

(A) Because they react with water to form alkali.

(B) Because they form acidic oxides.

(C) Because they are present in first group.

(D) Because they are less reactive in nature.

Space for Rough Work

36. In the reaction, $HNO_{3(aq)} + H_2O_{(l)} \rightarrow H_3O^+ + NO_3^-$ the nitrate is the

(A) Bronsted acid

(B) Bronsted base

(C) Conjugate acid

(D) Conjugate base

37. The metal that reacts with cold water is

(A) Mercury (B) Sodium

(C) Zinc (D) Tungsten

38. Brass is a mixture of

(A) Copper and zinc

(B) Copper and tin

(C) Copper, nickel and zinc

(D) Aluminium, copper and traces of Mg and Mn

39. The soil for healthy growth of plants should be

(A) Highly acidic

(B) Highly alkaline

(C) Neither alkaline nor highly acidic

(D) Either acidic or highly alkaline

40. Which of the following process is used in the extractive metallurgy of magnesium?

(A) Fused salt electrolysis

(B) Self reduction

(C) Aqueous solution electrolysis

(D) Thermite reduction

Space for Rough Work

SECTION – C : BIOLOGY

41. Which part of alimentary canal receives bile from the liver?
(A) Oesophagous (B) Small intistine (C) Stomach (D) Large intestine

42. The opening and closing of the stomatal pores depend upon.
(A) Oxygen (B) Water in guard cells
(C) Temperature (D) Concentration of CO_2 in stomata

43. In which of the following groups of organisms the foot material is broken down outside the body and then absorbed?
(A) Mushroom, Green plants, Amoeba (B) Yeast, Mushroom, Bread mould
(C) Paramecium, Amoeba, Cuscuta (D) Cuscuta, Lice, Tapeworm

44. In one of the following organisms, the gaseous exchange during respiration does not take place through cell membrane/ skin. This organism is
(A) Electrical eel (B) Leech (C) Farthworm (D) Amoeba

45. When air is blown from mouth into a test-tube containing time water, the lime water turns milky due to the presence of
(A) Oxygen (B) carbon dioxide (C) nitrogen (D) Water vapour

46. One of the following animals does not use tracheae as the respiratory organs. This animal is
(A) Grasshopper (B) Prawn (C) Mosquito (D) Cockroach

47. The breathing and respiration in woody stem of a plant takes place through.
(A) root hair (B) lenticels (C) closed stomata (D) open stomata

48. One of the following does not have a nucleus. This one is
(A) red blood cell (B) white blood cell (C) ground cell (D) epidermal cell

49. In which of the following vertebrate group/groups, heart does not pump oxygenated blood to different parts of the body?
(A) pisces and amphibians (B) amphibians and reptiles
(C) amphibians only (D) pisces only

Space for Rough Work

50. Which vein brings clean blood from the lungs into the heart?

(A) renal vein (B) pulmonary vein (C) vena cava (D) hepatic vein

51. The excretory organs is an earthworm are

(A) nephridia (B) nephrons (C) rophides (D) waters

52. The substance which is not reabsorbed into the blood capillaries surroundings the tubule of a nephron is mainly.

(A) glucose (B) amino acid (C) urea (D) water

53. Which of the following is not a plant hormone?

(A) auxin (B) ascorbic acid (C) cytokinin (D) abscisic acid

54. The root of a plant is

(i) Positively phototrophic but negatively geotropic

(ii) Positively geotropic but negatively phototropic

(iii) Negatively phototropic but positively hydrotropic

(iv) Negatively hydrotropic but positively phototropic

(A) i & ii (B) ii & iii (C) iii & iv (D) i & iv

55. Dandelion flower open the petals in bright light during the daytime but close the petals in dark at right. This response of dandelion flowers to light is called.

(A) phototropism (B) thigmonasty (C) chemotropism (D) photonasty

56. One of the following acts as an endocrine gland as well as exocrine gland. This one is

(A) Salivary gland (B) pancreas (C) pituitary (D) parathyroid

57. The number of pairs of nerves which arises from the spinal cord is :

(A) 21 (B) 31 (C) 41 (D) 51

58. All the voluntary actions of our body are controlled by:

(A) Cerebrum (B) Cerebellum (C) Pons (D) Medulla

59. The part of brain which takes part in regulating respiration in the human body is:

(A) medulla (B) Pons (C) cerebellum (D) cerebrum

60. The contraction of pupil of the eye in the presence of bright light is an example of :

(A) Voluntary reflex (B) spinal reflex (C) cerebral reflex (D) adrenal reflex

Space for Rough Work

SECTION – D : MENTAL ABILITY

61. Here are some words translated from an artificial language

miepie is blue light

mie tie is blue berry

aie tie is rasp berry

Which words could possible mean "light fly"?

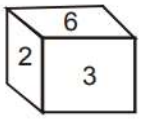
(A) pie zie (B) pie mie (C) aie zie (D) aie mie

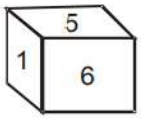
62. Select the correct alphabet number that is missing in the alphabet number series given below.

NAJ31, BEF28, RAM 31, ?, YAM31

(A) RPA31 (B) PRA30 (C) RPA30 (D) PAR31

63. Two faces of a cube are given below, which number will be opposite 3?





(A) 1 (B) 5 (C) 4 (D) 2

64. If FAST is coded as 798 and LAST is coded as 906 then BUSY is coded as

(A) 1759 (B) 1431 (C) 952 (D) 948

DIRECTIONS (Qs 65& 66): P, Q, R, S, T, V and W are seven members of a family. Each of them has a different profession – Lawyer, Chartered Accountant (CA), Engineer, Teacher, Doctor, Architect and Pharmacist. There are three female members. No lady is either Pharmacist or C.A. Each of them has a different monthly income. The Chartered Accountant earns the most. S, the engineer, earns less than V, the doctor. R, the teacher earns more than P and less than S, W's wife earns the least. T is an unmarried lady lawyer and she earns less than P and more than only Q. The pharmacist's income is not the lowest.

65. Which of the following pairs of professional represents the professions of husband and wife?

(A) Pharmacist, Architect (B) Chartered Accountant, Architect

(C) Engineer, Pharmacist (D) Chartered Accountant, Engineer

Space for Rough Work

66. Which of the following statements is false

(A) The Architect earns more than the Lawyer

(B) The teacher earns less than the Engineer

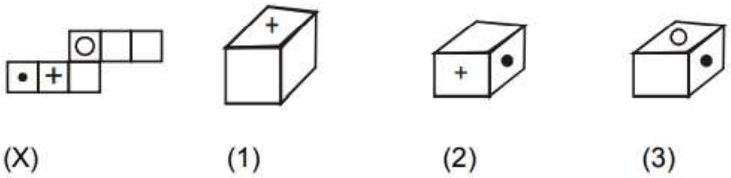
(C) The Doctor earns more than the Engineer

(D) The Pharmacist earns more than the Lawyer

67. Crime : Police: : Flood : ?

(A) Dam (B) River (C) Rain (D) Reservoir

68. When the given sheet of paper (X) is folded to make a cube, choose the cube that may be formed.

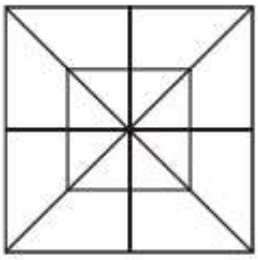


(X) (1) (2) (3)

(A) 1 only (B) 1,2 and 3 only

(C) 2 and 3 only (D) 1,2,3 and 4

69. What is the total number of triangles and total numbers of squares in the given figure?



(A) 28 triangles, 10 squares (B) 28 triangles, 8 squares

(C) 32 triangles, 10 squares (D) 32 triangles, 8 squares

70. A cube whose two adjacent faces are coloured is cut into 125 identical small cubes. How many of those small cubes are not coloured at all?

(A) 74 (B) 72 (C) 80 (D) 84

Space for Rough Work

71. Ronald is elder to Veena while Amilia and Shree are elder to Parul who lies between Ronald and Amilia. If Amilia is elder to Veena, then which one of the following statements is necessarily true?

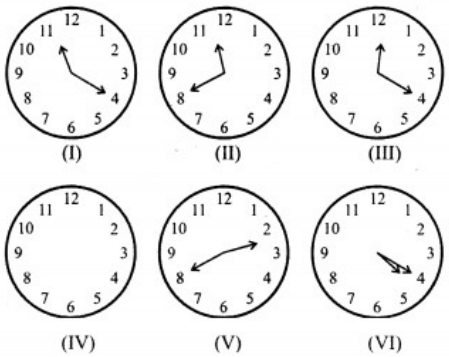
(A) Ronald is elder to Amilia (B) Amilia is elder to Shree

(C) Parul is elder to Shree (D) Parul is elder to Veena

72. A work is expected to be completed by 20 workers in 25 days. The work is started by 10 workers. Then, after every 5 days, 5 more workers join the work. In how many days the work will be completed?

(A) 20 (B) 25 (C) 30 (D) 35

73. What time should the IV clock show?



(A) 1:00 (B) 1 : 20 (C) 1:40 (D) 2:00

74. If P + Q means P is husband of Q, P/Q means P is sister of Q, P*Q means P is the son of Q. How is D related to A in D*B+C/A ?

(A) Son (B) Nephew (C) Sister (D) Couple

75. Afsana was walking in a desert. Anwar was passing by riding on a camel. Afsana requested for a lift. Anwar said he will give lift only to those who are related to him. At this, Afsana told him that Anwar's mother-in-law is the mother of her mother-in-law. How is Anwar related to Afsana ?

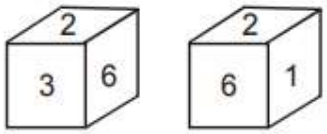
(A) Father (B) Maternal uncle (C) Brother-in-law (D) Father-in-law

Space for Rough Work

76. How many digits are there in $6^3 \times 2^{98} \times 5^{99}$?

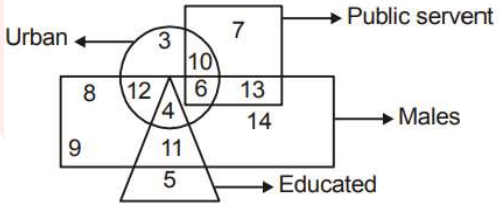
(A) 100 (B) 101 (C) 102 (D) 103

77. Two positions of a dice are shown. When number 3 is on the top, what number will be at the bottom?



(A) 1 but not 4 (B) 4 but not 1 (C) 5 or 4 (D) 5 but not 4

DIRECTION (Q. No. 78-79): Are based on the given diagram. Study the diagram carefully to answer the questions. In the diagram, rectangle represents males, triangle represents educated, square represents public servants and circle represents urban.



78. Out of following options, how many educated males are neither public servant nor urban?

(A) 10 (B) 4 (C) 11 (D) 9

79. Out of the following options, how many persons are urban who are public servants not educated or males?

(A) 3 (B) 5 (C) 6 (D) 10

80. Looking at a woman sitting next to him, Amit said, "She is the sister of the husband of my wife". How is the women related to Amit?

(A) Niece (B) Daughter (C) Sister (D) Wife

Space for Rough Work