MENTORS EDUSERV

SCHOLASTIC APTITUDE TEST [ME-SAT]

SAMPLE TEST PAPER

[For Students going to Class 11 in 2021]

[STREAM: ENGINEERING]

Time : 2 hours **Maximum Marks: 240**

DO NOT BREAK THE SEALS ON THIS BOOKLET, AWAIT INSTRUCTIONS FROM THE INVIGILATOR.

INSTRUCTIONS

[A] General

1. This Question paper contains **FOUR** Parts, **A to D** (Physics, Chemistry, Mathematics and Mental Ability).
2. This Question Paper contains **13 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.

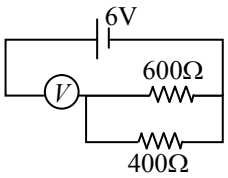
SEAL

Name :.....

Registration No.: | | | | | | | | | | | | | | | |

PART-A : PHYSICS

1. The measurement of voltmeter (ideal) in the following circuit is

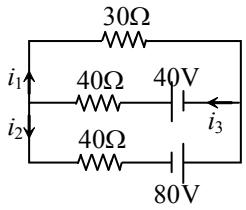


(A) 2.4 V (B) zero (C) 4.0 V (D) 6.0 V

2. A current I is passing through a wire having two sections P and Q of uniform diameters d and $d/2$ respectively. If the mean drift velocity of electrons in section P and Q is denoted by v_P and v_Q respectively, then

(A) $v_P = v_Q$ (B) $v_P = \frac{1}{2}v_Q$ (C) $v_P = \frac{1}{4}v_Q$ (D) $v_P = 2v_Q$

3. In the given circuit the current i_1 is



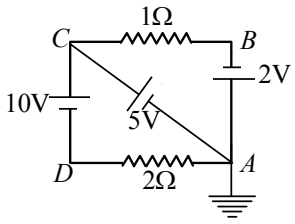
(A) 0.4 A

(B) –0.4 A

(C) 0.8 A

(D) –0.8 A

4. In the circuit shown in the figure, the ratio of V_B as to V_C is



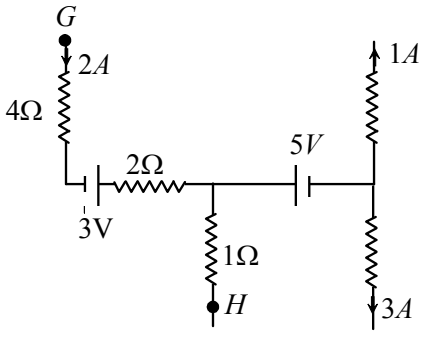
(A) –2/5

(B) –5/2

(C) 1

(D) 1/3

5. In the part of a circuit shown in the figure, the potential difference between points G and H ($V_G - V_H$) will be



(A) 0 V (B) 15 V (C) 7 V (D) 3 V

6. The filament of an electric heater should have

(A) high resistivity and high melting point

(B) low resistivity and high melting point

(C) high resistivity and low melting point

(D) low resistivity and low melting point

7. When a long wire carrying a steady current is bent into a circular coil of one turn, the magnetic induction at its centre is *B*. When the same wire carrying the same current is bent to form a circular coil of *n* turns of a smaller radius, the magnetic induction at the centre will be

(A) B/n (B) nB (C) B/n^2 (D) n^2B

8. A long soleniod has 200 turns per cm and carries a current *i*. The magnetic field at its centre is 6.28×10^{-2} Weber/m^2. Another long solenoid has 100 turns per cm and it carries a current $\frac{i}{3}$. The value of the magnetic field at its centre is

(A) 1.05×10^{-4} Weber/m^2 (B) 1.05×10^{-2} Weber/m^2

(C) 1.05×10^{-5} Weber/m^2 (D) 1.05×10^{-3} Weber/m^2

9. Through two parallel wires *A* and *B*, 10 and 2 ampere of currents are passed respectively in opposite direction. If the wire *A* is infinitely long and the length of the wire *B* is 2 m, the force on the wire *B*, which is situated at 10 cm distance from *A* will be

(A) 8×10^{-5} N (B) 4×10^{-7} N (C) 4×10^{-5} N (D) $4\pi \times 10^{-7}$ N

10. A solenoid of 1.5 metre length and 4.0 cm diameter possesses 10 turn per cm. A current of 5 ampere is flowing through it. The magnetic induction at axis inside the solenoid is

(A) $2\pi \times 10^{-3}$ Tesla (B) $2\pi \times 10^{-5}$ Tesla

(C) $4\pi \times 10^{-2}$ Gauss (D) $2\pi \times 10^{-5}$ Gauss

11. A wire carrying current *I* and other carrying 2*I* in the same direction produces a magnetic field *B* at the mid point. What will be the field when 2*I* wire is switched off?

(A) *B*/2 (B) 2*B* (C) *B* (D) 4*B*

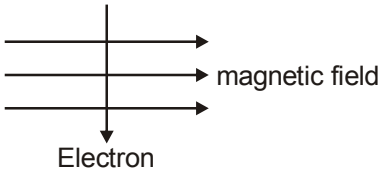
12. An electron enters a magnetic field at right angles to it, as shown in Figure. The direction of force acting on the electron will be

(A) to the right

(B) to the left.

(C) out of the page

(D) into the page.



13. Which of the following property of a proton can change while it moves freely in a magnetic field?

(A) mass (B) speed (C) kinetic energy (D) momentum

14. A piece of wire of resistance R is cut into five equal parts. These parts are then connected in parallel. If the equivalent resistance of this combination is R', then the ratio R/R' is

(A) 1/25 (B) 1/5 (C) 5 (D) 25

15. An electric bulb is rated 220 V and 100 W. When it is operated on 110 V, the power consumed will be

(A) 100 W (B) 75 W (C) 50 W (D) 25 W

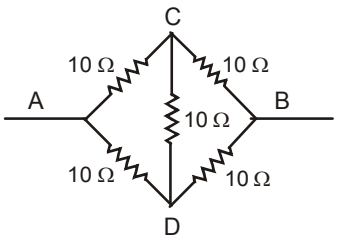
16. Find the equivalent resistance for the given network across AB

(A) $10\,\Omega$

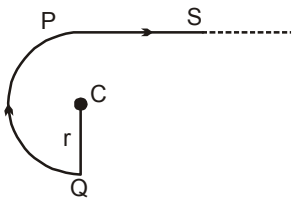
(B) $15\,\Omega$

(C) $20\,\Omega$

(D) $25\,\Omega$



17. The magnetic field induction at the centre *C* of the arrangement shown in figure is



(A) $\frac{\mu_0 i}{4\pi r}(1+\pi)$ (B) $\frac{\mu_0 i}{2\pi r}(1+\pi)$ (C) $\frac{\mu_0 i}{\pi r}(1+\pi)$ (D) $\frac{\mu_0 i}{r}(1+\pi)$

18. The number of turns in the coils is doubled without changing the length of the solenoid. The magnetic field at the centre of the solenoid will be :

(A) doubled (B) halved (C) unchanged (D) none of these

19. Choose the incorrect statement.

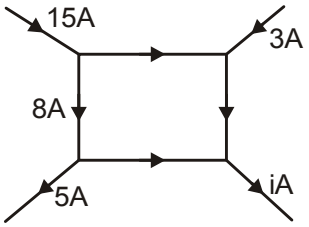
(A) Fleming's right-hand rule is a simple rule to know the direction of induced current

(B) The right-hand thumb rule is used to find the direction of magnetic fields due to current carrying conductors

(C) The difference between the direct and alternating currents is that the direct current always flows in one direction, whereas the alternating current reverses its direction periodically

(D) In India, the AC changes direction after every $\frac{1}{50}$ second

20. The value of current i in the circuit shown in the figure



(A) 10 A (B) 11A (C) 12 A (D) 13 A

PART-B : CHEMISTRY

21. Barium chloride on reacting with ammonium sulphate forms barium sulphate and ammonium chloride. Which of the following correctly represents the type of the reaction involved?

(i) Displacement reaction (ii) Precipitation reaction

(iii) Combination reaction (iv) Double displacement reaction

(A) (i) only (B) (ii) only

(C) (iv) only (D) (ii) and (iv)

22. In the balanced equation a, b, c and d respectively are

$$aFe_2O_3 + bH_2 \rightarrow cFe + dH_2O$$

(A) 1, 1, 2, 3 (B) 1, 1, 1, 1 (C) 1, 3, 2, 3 (D) 1, 2, 2, 3

23. Which of the following statement is true?

(A) The total mass of the substance remains same in chemical change.

(B) Chemical change in permanent and irreversible.

(C) Physical change is temporary and reversible.

(D) All of these.

24. Plaster of Paris hardens by

(A) giving off CO_2 (B) changing into $CaCO_3$

(C) combining with water (D) giving out water

25. 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

26. Which out of the following has smell similar to that of vinegar ?

(A) Methanol (B) Ethanol (C) Ethanoic acid (D) Formic acid

27. Which gas is passed through dry slaked lime to produce bleaching powder?

(A) H_2 (B) O_2 (C) Cl_2 (D) N_2

28. Ferrous sulphate on heating produces

(A) ferric oxide (B) carbon dioxide (C) oxygen (D) water

29. Aluminium is more reactive than iron. But aluminium is less easily corroded than iron because

(A) aluminium is a noble metal

(B) oxygen forms a protective oxide layer

(C) iron undergoes reaction easily with water

(D) iron forms mono and divalent ions

30. Acids like lactic acid, uric acid which are obtained usually from plants and animals

(A) organic acid (B) inorganic acid (C) oxyacid (D) hydra acid

31. Choose one example of inorganic acid (mineral acid) from the following.

(A) Oxalic acid (B) Acetic acid (C) Nitric acid (D) Formic acid

32. Which of the following statements is true regarding acids and bases?

(A) Acids and bases don't react with each other

(B) Acids mixed with bases neutralise each other

(C) Acids mixed with bases make stronger acids

(D) Acids mixed with bases make weaker acids

33. Which gas is evolved when acids react with metal carbonates?

(A) CO_2 (B) H_2 (C) NH_3 (D) H_2O_2

34. Which acid is used in flavoured drinks?

(A) Boric acid (B) Carbonic acid (C) Sulphuric acid (D) Oxalic acid

35. Sour milk contains

(A) lactic acid (B) acetic acid (C) tartaric acid (D) citric acid

36. Which of the following statements is correct? Rusting of iron is a chemical change because

(A) a new substance with new properties is produced

(B) chemical composition of reactant is changed

(C) change is permanent and can not be reversed easily

(D) all of these

37. Acetic acid is a weak acid because

(A) its aqueous solution is acidic (B) it is highly ionized

(C) it is weakly ionized (D) it contains – COOH group

38. A solution turns blue litmus red. The pH of the solution is probably

(A) 8 (B) 10 (C) 12 (D) 6

39. Iron nails were dipped in solution kept in a test tube. After half an hour, it was observed that the colour of the solution has changed. The solution present in, the test tube was that of

(A) zinc sulphate (B) copper sulphate

(C) iron sulphate (D) aluminium sulphate

40. In the balanced equation $Cu + xHNO_3 \rightarrow Cu(NO_3)_2 + yNO_2 + 2H_2O$

The values of x and yare

(A) 3 and 5 (B) 8 and 6 (C) 4 and 2 (D) 7 and 1

PART-C : MATHEMATICS

41. For what value of k, the following system of equations will be inconsistent ?

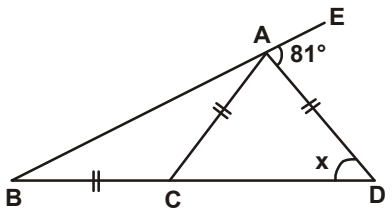
$4x + 6y = 11, 2x + ky = 7$

(A) 1 (B) 2 (C) 3 (D) 4

42. If $\text{cosec}\, A + \cot A = \frac{11}{2}$, then $\cos A$ is equal to

(A) $\frac{21}{22}$ (B) $\frac{15}{16}$ (C) $\frac{117}{125}$ (D) None of these

43. In the given figure, BC = AC = AD, $\angle EAD = 81°$, then the value of x is



(A) 45° (B) 54° (C) 63° (D) 36°

44. The hypotenuse of right triangle is 25 cm. The difference between the lengths of the other two sides of the triangle is 5 cm. Then the length of shorter side is equal to

(A) 10 cm (B) 15 cm (C) 20 cm (D) 25 cm

45. If the L.C.M of two numbers is 2520 and HCF is 12. Its one number is 504, then the other number will be

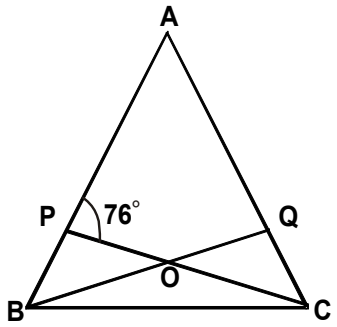
(A) 50 (B) 65 (C) 40 (D) 60

46. A father is 7 times as old as his son. Two years ago, the father was 13 times as old as his son. Father's present age is

(A) 24 years (B) 28 years

(C) 30 years (D) 32 years

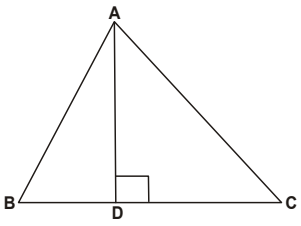
47. In the given figure, $\triangle ABC$ is isosceles with AB = AC and OB = OC.



What is the measure of $\angle AQB$?

(A) 113° (B) 90° (C) 76° (D) 45°

48. If ΔABC, is an equilateral triangle in which $AD \perp BC$, AD = 12 cm, then the side of the triangle is



(A) $\frac{24}{\sqrt{3}}$ cm (B) $\frac{12}{\sqrt{3}}$ cm (C) $\frac{6}{\sqrt{3}}$ cm (D) $\frac{28}{\sqrt{3}}$ cm

49. Simplify the following $\frac{1}{1+a^{m-n}}+\frac{1}{1+a^{n-m}}$

(A) 1 (B) 3 (C) 5 (D) 8

50. The value of cos 1°. cos 2°. cos 3°. .....cos 179° is equal to

(A) – 1 (B) 0 (C) 1 (D) $\frac{1}{\sqrt{2}}$

51. $\frac{\tan\theta\sqrt{1-\sin^2\theta}}{\sqrt{1-\cos^2\theta}}$ $(0 < \theta < 90°)$

(A) $\sin\theta$ (B) $\cos\theta$ (C) $\sec\theta$ (D) 1

52. Some people complete a work in 20 days. If the number of people is doubled and work is halved, in how many days will they complete it?

(A) 5 (B) 10 (C) 20 (D) 40

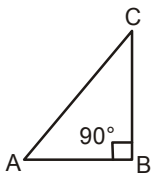
53. If $\sin\theta + \text{cosec}\theta = 2$ then $\sin^{100}\theta + \text{cosec}^{100}\theta = ...$

(A) 1 (B) 2 (C) 4 (D) None of these

54. The value of $\cot^2 30^0 - 2\cos^2 60^0 - \frac{3}{4}\sec^2 45^0 - 4\sin^2 30^0$ is

(A) 0 (B) 1 (C) –1 (D) none of the

55. A right angle triangle right angled at 'B' as given below in the figure



If AB + AC = 9 cm, and BC = 3 cm, then value of cot C is equal to

(A) $\frac{3}{4}$ (B) $\frac{1}{4}$ (C) $\frac{5}{4}$ (D) None of these

56. If $ax^4 + bx^3 + cx^2 + dx + e$ is a polynomial where a + b + c + d + e = 0, then one of its factor is

(A) x – 1 (B) x + 1 (C) x – 2 (D) x + 2

57. The value of $3(\sin x + \cos x)^4 - 6(\sin x + \cos x)^2 + 4(\sin^6 x + \cos^6 x)$ which when simplified is equal to

(A) 0 (B) 1 (C) 2 (D) 3

58. If $\sin\theta_1 + \sin\theta_2 + \sin\theta_3 = 3$ then $\cos\theta_1 + \cos\theta_2 + \cos\theta_3 = ...$

(A) 3 (B) 2 (C) 1 (D) 0

59. If '3' is a root of $x^2 + kx - 24 = 0$ it is also root of

(A) $x^2 + 5x + k = 0$ (B) $x^2 + kx + 24 = 0$

(C) $x^2 - kx + 6 = 0$ (D) $x^2 - 5x + k = 0$

60. H.C.F. of $(x^3 - 3x + 2)$ and $(x^2 - 4x + 3)$ is

(A) (x – 1) (B) $(x - 2)^2$ (C) (x – 1) (x + 2) (D) (x – 1) (x – 3)

PART-D : MENTAL ABILITY

DIRECTION : In each of the following questions, there is a certain relationship between two given words on one side of (::) and one word is given on another side (::) while another word is to be found from the given alternatives having the same relation with this word as the words of the given pair bear. Choose the correct alternative.

61. Sheep : Flock : : Fish : _____ ?

(A) Mob (B) Chorus (C) Shoal (D) Stock

62. Whale : Mammal : : Rat : _____ ?

(A) Rodent (B) Reptile (C) Insect (D) Amphibian

DIRECTION : In the following questions, two words are given which are related to each other in a particular manner and you have to find the word from the alternatives which bears exactly same relationship to the third word, as the first two bear.

63. CFIL : ABCD : : ? : WXYZ

(A) YBEH (B) YBHE (C) BYEH (D) YBHH

64. 8 : 28 : : 15 : ?

(A) 75 (B) 63 (C) 65 (D) 71

65. If 2nd half of the English alphabet is written in reverse order, then find the 19th letter from right.

(A) W (B) U (C) V (D) S

66. If in a certain code language 'ree ra de' means 'what was it', 'mo nil' means 'you go', 'nil pom ra' means 'you like it' and 'took lee to' means 'she was sick' then how will you write 'what you like' in that language ?

(A) de nil pom (B) pom nil ra (C) nil ra lee (D) None of these

DIRECTION : In the following questions, replace the question mark (?) with the suitable option.

67. 6, 11, 23, 45, _____ ?

(A) 95 (B) 91 (C) 98 (D) 97

68. 7, 22, 69, 212, _____ ?

(A) 652 (B) 673 (C) 643 (D) 645

69. 77, 49, 36, 18, _____ ?

(A) 18 (B) 16 (C) 11 (D) 8

DIRECTION : What comes in place of question mark(s) in the following letter series ?

70. XYZ, ABC, UVW, DEF, RST, GHI, ?

(A) UVW (B) JKL (C) OPQ (D) NOP

71. CIG, FLJ, IOM, ?

(A) LRP (B) JLG (C) PSU (D) QUB

DIRECTION : In each of the following letter series, some of the letters are missing which are given in that order as one of the alternatives below it. Select the correct alternatives.

72. a __ ba __ bb __ ab __ a

(A) baab (B) aaba (C) abab (D) baaa

73. ab__ aa__ aaa__ a__ ab__ a

(A) abbab (B) abaaa (C) aabba (D) abbaa

DIRECTION : In following question, a set of figures carrying certain characters is given. Assuming that the characters in each set follow a similar pattern, find the missing character in each case.

74. **7 9 36**

5 6 03

4 ? 02

(A) 8 (B) 3 (C) 5 (D) 2

75. Dev correctly remembers that his mother's birthday is not after 21th of March. His sister correctly remembers that their mother's birthday is before 23th March but after 20th March. On which day in June was definitely their mother's birthday ?

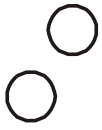
(A) 23rd (B) 22nd (C) 21th (D) 21th or 22th

76. If A means '+', B means '–', C means '×' and D means ÷, then

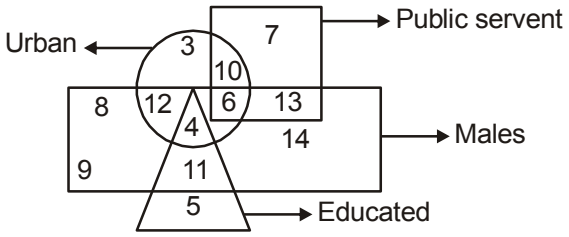
16 C 32 D 8 A 5 B 15 = ?

(A) 54 (B) 38 (C) 88 (D) 58

77. Which of the following diagrams represents a relationship between Spinach and vegetable ?

(A)  (B)  (C)  (D) 

DIRECTION : 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 servent 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. Out of the following options, how many persons are both educated males and urban?

(A) 4 (B) 2 (C) 5 (D) 11

MENTORS EDUSERV

SCHOLASTIC APTITUDE TEST [ME-SAT]

SAMPLE TEST PAPER

[For Students going to Class 11 in 2021]

[STREAM: ENGINEERING]

Time : 2 hours **Maximum Marks: 240**

PHYSICS

1.	(D)	2.	(C)	3.	(B)	4.	(A)	5.	(C)
6.	(A)	7.	(D)	8.	(B)	9.	(A)	10.	(A)
11.	(C)	12.	(D)	13.	(D)	14.	(D)	15.	(D)
16.	(A)	17.	(A)	18.	(A)	19.	(D)	20.	(D)

CHEMISTRY

21.	(D)	22.	(C)	23.	(D)	24.	(C)	25.	(B)
26.	(C)	27.	(C)	28.	(A)	29.	(B)	30.	(A)
31.	(C)	32.	(B)	33.	(A)	34.	(B)	35.	(A)
36.	(D)	37.	(C)	38.	(D)	39.	(B)	40.	(C)

MATHEMATICS

41.	(C)	42.	(C)	43.	(B)	44.	(B)	45.	(D)
46.	(B)	47.	(C)	48.	(A)	49.	(A)	50.	(B)
51.	(D)	52.	(A)	53.	(B)	54.	(A)	55.	(A)
56.	(A)	57.	(B)	58.	(D)	59.	(C)	60.	(A)

MENTAL ABILITY

61.	(C)	62.	(A)	63.	(A)	64.	(C)	65.	(B)
66.	(A)	67.	(B)	68.	(C)	69.	(D)	70.	(C)
71.	(A)	72.	(A)	73.	(D)	74.	(C)	75.	(C)
76.	(A)	77.	(B)	78.	(C)	79.	(D)	80.	(A)