



MENTORS EDUSERV TALENT REWARD EXAM (METRE) SAMPLE TEST PAPER

[For Students presently in Class 10 going to Class 11 in 2019]

[Stream: Engineering]

Time : 2 hours

Maximum Marks: 240

INSTRUCTIONS

[A] General

1. This Question paper contains **FOUR** Parts, **A to D** (Physics, Chemistry, Mathematics and Mental Ability).
2. This Question Paper contains **15 pages**.
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.

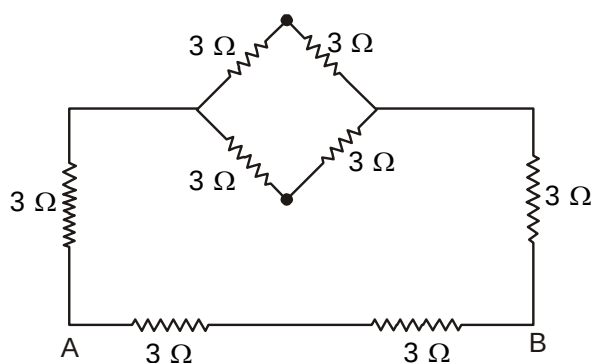
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PART-A : PHYSICS

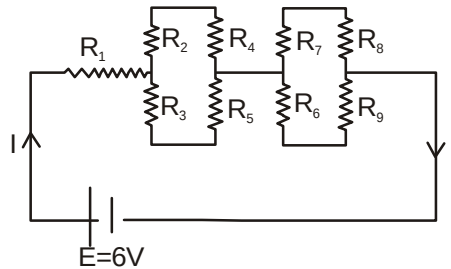
- The specific resistance of manganin is $50 \times 10^{-8} \text{ ohm} \times \text{m}$. The resistance of a cube of length 50 cm will be
 (A) 10^{-6} ohm (B) $2.5 \times 10^{-6} \text{ ohm}$ (C) 10^{-8} ohm (D) $5 \times 10^{-4} \text{ ohm}$
- The temperature coefficient of resistance for a wire is $0.00125 / ^\circ\text{C}$. At 300 K its resistance is 1 ohm. The temperature at which the resistance becomes 2 ohm is
 (A) 1154 K (B) 1100 K (C) 1400 K (D) 1127 K
- 62.5×10^{18} electrons per second are flowing through a wire of area of cross-section 0.1 m^2 , the value of current flowing will be
 (A) 1 A (B) 0.1 A (C) 10 A (D) 0.11 A
- The resistance of a wire of uniform diameter d and length L is R . The resistance of another wire of the same material but diameter $2d$ and length $4L$ will be
 (A) $2R$ (B) R (C) $R/2$ (D) $R/4$
- Equivalent resistance between A and B will be



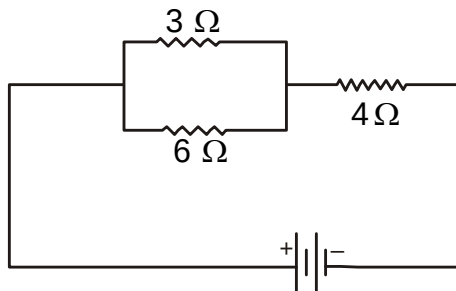
- (A) 2 ohm (B) 18 ohm (C) 6 ohm (D) 3.6 ohm

Space for rough work

6. Nine resistors each of resistance $1\text{ k}\Omega$ are connected to a battery of 6 V as shown in the circuit given below. What is the total current flowing in the circuit



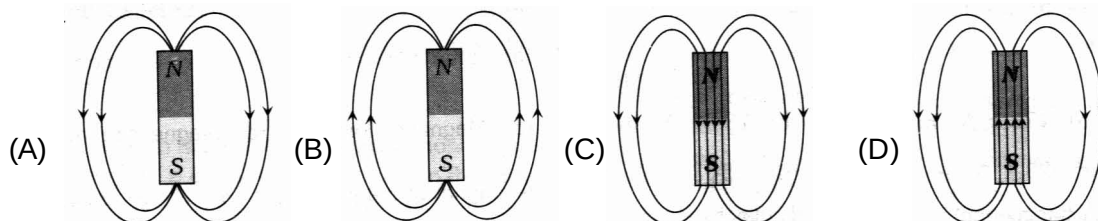
- (A) 3 mA (B) $\frac{2}{3}\text{ mA}$ (C) $\frac{3}{2}\text{ mA}$ (D) 2 mA
7. In the figure current through the 3Ω resistor is 0.8 ampere , then potential drop through 4Ω resistor is



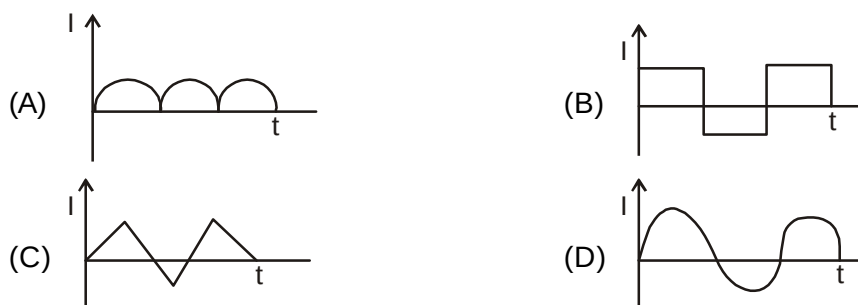
- (A) 9.6 V (B) 2.6 V (C) 4.8 V (D) 1.2 V
8. S.I. Unit of magnetic flux density is
- (A) Tesla (B) Weber/metre²
- (C) Newton/ampere-metre (D) All of the above

Space for rough work

9. The magnetic field lines due to a bar magnet are correctly shown in



10. Which of the following is not AC :



11. In the nuclear reaction ${}_{92}\text{U}^{235} + {}_0\text{n}^1 \Rightarrow {}_{56}\text{Ba}^{141} + {}_{36}\text{Kr}^{92} + 3\text{X} + 200\text{Mev}$, X represents:

- (A) Proton (B) Neutron (C) Electron (D) Alpha particle

12. Volt is the SI unit of

- (A) potential difference (B) current
(C) resistance (D) charge

13. The magnetic lines of force

- (A) always intersect each other
(B) never intersect each other
(C) sometimes intersect and sometimes do not intersect
(D) are always parallel to each other.

Space for rough work

14. The direction of induced current in a circuit is given by
(A) Fleming's left-hand rule (B) Fleming's right hand rule
(C) Right hand grip rule (D) Ampere's swimming rule
15. Current carrying conductor placed in a magnetic field experiences a force. The device based on this principle is
(A) electrical generator (B) electric motor
(C) electric bell (D) none of these.
16. The force on a charged particle which is moving in a magnetic field is maximum when the angle between direction of motion and field is
(A) zero (B) 90° (C) 180° (D) 45°
17. In which of the following device/process solar energy is converted into chemical energy?
(A) Solar evaporation (B) Photosynthesis
(C) Solar cells (D) Solar heater
18. Which one of the plants use conventional source of energy?
(A) Thermal power plant (B) Hydropower plant
(C) Solar panels (D) Windmill farm
19. Which of the following is not a form of ocean energy?
(A) Geothermal energy (B) Ocean thermal energy
(C) Tidal energy (D) Wave energy
20. The effect of using split rings in a simple DC motor is that :
(A) the direction of rotation of the coil is reversed.
(B) the current in the coil always flows in the same direction.
(C) the direction of the current flowing in the coil is reversed.
(D) none of these

Space for rough work

PART-B : CHEMISTRY

21. Plaster of Paris is obtained
- (A) by adding water to calcium sulphate
 - (B) by adding sulphuric acid to calcium hydroxide
 - (C) by heating gypsum to a very high temperature
 - (D) by heating gypsum to 120°C
22. 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
23. Which set of acids is solid in nature?
- (A) Boric acid, oxalic acid
 - (B) Acetic acid and boric acid
 - (C) Formic acid and oxalic acid
 - (D) Formic acid and acetic acid
24. Which is not a dibasic acid?
- (A) Carbonic acid (H_2CO_3)
 - (B) Sulphurous acid (H_2SO_3)
 - (C) Formic acid (HCOOH)
 - (D) Oxalic acid [$(\text{COOH})_2$]
25. On electrolysis of brine solution, the products formed are
- (A) sodium and chlorine
 - (B) hydrogen, chlorine and oxygen
 - (C) hydrogen, chlorine and sodium hydroxide
 - (D) sodium hydroxide, chlorine and oxygen

Space for rough work

26. What will be the pH value of 0.05 M Ba(OH)_2 solution?
(A) 12 (B) 13 (C) 1 (D) 12.96
27. Which of the following has highest pH ?
(A) $\frac{M}{4}\text{KOH}$ (B) $\frac{M}{4}\text{NaOH}$ (C) $\frac{M}{4}\text{NH}_4\text{OH}$ (D) $\frac{M}{4}\text{Ca(OH)}_2$
28. The reducing agent in thermite process is
(A) Mg (B) Al (C) Cr (D) Fe
29. Metals like copper, mercury and lead are obtained from their oxide ores by
(A) carbon reduction (B) aluminium reduction
(C) self reduction (D) electrolytic reduction
30. The process of heating an ore in limited air and below its melting point is called
(A) smelting (B) roasting (C) calcination (D) pyrolysis
31. Which of the following oxide cannot be reduced with carbon to obtain the metal?
(A) MnO_2 (B) Cr_2O_3 (C) Al_2O_3 (D) All of these
32. The process of electrolysis is used for obtaining such metals which are
(A) highly reactive (B) moderately reactive
(C) highly unreactive (D) all types of metals
33. In metallurgical process the flux used for removing acidic impurities is
(A) silica (B) sodium chloride (C) limestone (D) sodium carbonate
34. The difference of water molecules in gypsum and Plaster of Paris is
(A) 5/2 (B) 2 (C) 1/2 (D) 3/2

Space for rough work

35. If tartaric acid is not added in baking powder, the cake will taste bitter due to the presence of
(A) sodium hydrogen carbonate (B) sodium carbonate
(C) carbon dioxide (D) some unreacted tartaric acid
36. Which of the following is incorrectly matched?
(A) Tomato – tartaric acid (B) Ant sting – methanoic acid
(C) Citrus fruit – citric acid (D) Curd – lactic acid
37. The solution with the lowest concentration of H^+ ion is
(A) pH = 7 (B) pH = 8.6 (C) pH = 2.0 (D) pH = 6.8
38. $aMg_3N_2 + bH_2O \rightarrow cMg(OH)_2 + dNH_3$. When the equation is balanced, the coefficients a, b, c, d respectively are
(A) 1, 3, 3, 2 (B) 1, 6, 3, 2 (C) 1, 2, 3, 2 (D) 2, 3, 6, 2
39. In the reaction, $Br_2 + 2I^- \rightarrow 2Br^- + I_2$, the oxidizing agent is
(A) Br_2 (B) I^- (C) Br^- (D) I_2
40. Ferrous sulphate on heating produces
(A) ferric oxide (B) carbon dioxide (C) oxygen (D) water

PART-C : MATHEMATICS

41. The LCM of two numbers is 1200. Which of the following cannot be their HCF?
(A) 600 (B) 500 (C) 200 (D) 400
42. LCM of two co-primes (say x and y) is
(A) $x + y$ (B) $x - y$ (C) xy (D) $\frac{x}{y}$

Space for rough work

43. Which of the following is/are always true?
- (A) Every irrational number is a surd.
- (B) Any surd of the form $\sqrt[n]{a} + \sqrt[n]{b}$ can be rationalised by a surd of the form $\sqrt[n]{a} - \sqrt[n]{b}$, where $\sqrt[n]{a}$ and $\sqrt[n]{b}$ are surds.
- (C) Both (A) and (B)
- (D) Neither (A) nor (B)
44. The following are the steps involved in finding the LCM of 72 and 48 by prime factorization method. Arrange them in sequential order from first to last.
- (a) $72 = 2^3 \times 3^2$ and $48 = 2^4 \times 3^1$
- (b) $\text{LCM} = 16 \times 9$
- (c) All the distinct factors with highest exponents are 16 and 9
- (A) abc (B) acb (C) cab (D) bca
45. The LCM of the polynomials $18(x^4 - x^3 + x^2)$ and $24(x^6 + x^3)$ is
- (A) $72x^2(x+1)(x^2 - x + 1)^2$ (B) $72x^3(x^2 - 1)(x^3 - 1)$
- (C) $72x^3(x^3 - 1)$ (D) $72x^3(x^3 + 1)$
46. If the zeroes of the rational expression $(3x + 2a)(2x + 1)$ are $-\frac{1}{2}$ and $\frac{b}{3}$, then the value of a is
- (A) $-2b$ (B) $-\frac{b}{2}$ (C) $-\frac{b}{3}$ (D) None of these

Space for rough work

47. If the LCM of $f(x)$ and $g(x)$ is $a^6 - b^6$, then their HCF is can be
 (A) $a - b$ (B) $a^2 + ab + b^2$ (C) $a^2 - ab + b^2$ (D) All of these
48. If the system of equations $2x - 3y = 3$ and $-4x + qy = \frac{p}{2}$ is inconsistent, which of the following can not be the value of p ?
 (A) -24 (B) -18 (C) -12 (D) -36
49. Find the value of $\sqrt{30 + \sqrt{30 + \sqrt{30 + \dots \infty}}}$
 (A) 6 (B) -5
 (C) Either (A) or (B) (D) Neither (A) nor (B)
50. $\sin^2 20^\circ + \sin^2 70^\circ$ is equal to
 (A) 1 (B) -1 (C) 0 (D) 2
51. $\frac{\sin^4 \theta - \cos^4 \theta}{\sin^2 \theta - \cos^2 \theta}$ is equal to
 (A) -1 (B) 2 (C) 0 (D) 1
52. $\frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta} + \frac{\sin \theta - \cos \theta}{\sin \theta + \cos \theta}$ is equal to
 (A) $\frac{2}{1 - 2\cos^2 \theta}$ (B) $\frac{2}{2\sin^2 \theta - 1}$ (C) Both (A) and (B) (D) None of these
53. If $\cot A = \frac{5}{12}$ and A is not in the first quadrant, then $\frac{\sin A - \cos A}{1 + \cot A}$
 (A) $\frac{-74}{25}$ (B) $\frac{-84}{221}$ (C) $\frac{-87}{223}$ (D) None of these

Space for rough work

54. $\frac{1 - \cos \theta}{\sin \theta} + \frac{\sin \theta}{1 - \cos \theta}$ is equal to
(A) $2 \sin \theta$ (B) $2 \cos \theta$ (C) $2 \operatorname{cosec} \theta$ (D) $2 \sec \theta$
55. In two triangles ABC and DEF, $\angle A = \angle D$. The sum of the angles A and B is equal to the sum of the angle D and E. If $BC = 6$ cm and $EF = 8$ cm, find the ratio of the area of the triangles, ABC and DEF.
(A) 3 : 4 (B) 4 : 3 (C) 9 : 16 (D) 16 : 9
56. A man travels on a bicycle, 10 km east from the starting point A to reach point B, then the cycles 15 km south to reach point C. Find the shortest distance between A and C.
(A) 25 km (B) 5 km (C) $25\sqrt{13}$ km (D) $5\sqrt{13}$ km
57. The number of real solution of the pair of equation $x + y + xy = 19$ and $x^2 + y^2 = 25$ is
(A) 1 (B) 2 (C) 3 (D) 0
58. In an equilateral triangle ABC if $AD \perp BC$, then :
(A) $2AB^2 = 2AD^2$ (B) $4AB^2 = 3AD^2$ (C) $3AB^2 = 4AD^2$ (D) none of these
59. The ratio in which the line joining points $(a + b, b + a)$ and $(a - b, b - a)$ is divided by the points (a, b) is
(A) $b : a$ internally (B) 1 : 1 internally (C) $a : b$ externally (D) 2 : 1 externally
60. In what ratio does the line $4x + 3y - 13 = 0$ divide the line segment joining the points $(2, 1)$ and $(1, 4)$:
(A) 3 : 2 internally (B) 2 : 3 externally (C) 2 : 3 internally (D) 3 : 2 externally

Space for rough work

PART-D : MENTAL ABILITY

- 61.** Anoop starts walking towards South, After walking 15 m he turns towards North. After walking 20 m, he turns towards East and walks 10 m. He then turns towards South and walks 5 m. How far is he from his original position and in which direction?
- (A) 10 m, North (B) 10 m, South (C) 10 m, West (D) 10 m, East
- 62.** Village Chimur is 20 km to the North of village Rewa. Village Rahate is 18 km to the East of village Rewa. Village Angne is 12 km to the West of Chimur. If Sanjay starts from village Rahate and goes to village Angne, in which direction is he from his starting point?
- (A) North (B) North-West (C) South (D) South-East
- 63.** If $H = 8$ and $HAT = 29$, find how $BOX = ?$
- (A) 46 (B) 43 (C) 42 (D) 41

DIRECTIONS (Q. Nos. 64-66) : From the given alternative words, select the word which cannot be formed using the letters of the given word.

- 64. UNCONTAMINATED**
- (A) MINE (B) NATON (C) CONNOTE (D) TANDEM
- 65. PROVINCIALISM**
- (A) SAILOR (B) NAIL (C) MAN (D) INITIAL
- 66. DEPARTMENT**
- (A) ENTER (B) PARENT (C) TEMPER (D) PARADE
- 67.** Which of the following interchange of sign would make the given equation correct?
- $$64 \times 8 \div 6 \times 8 = 6$$
- (A) + and – (B) $\div$ and $\times$ (C) + and $\div$ (D) – and $\times$

Space for rough work

68. If + stands for division; $\times$ stands for addition; $-$ stands for multiplication; $\div$ stands for subtraction, which of the following is correct?

(A) $15 \div 5 \times 2 - 6 + 3 = 28$

(B) $15 \times 5 + 2 - 6 \div 3 = 56.5$

(C) $15 + 5 - 2 \div 6 \times 3 = 3$

(D) $15 - 5 + 2 \times 6 \div 3 = 41$

DIRECTIONS (Q. Nos. 69-71) : Select the missing number from the given responses.

69.

14	10	22
2	3	4
7	3	11
4	10	?

(A) 2

(B) 4

(C) 6

(D) 8

70.

6	8	7
36	64	49
24	48	35
18	24	?

(A) 17

(B) 18

(C) 19

(D) 21

71.

5	2	3
3	6	5
4	7	2
60	84	?

(A) 10

(B) 25

(C) 30

(D) 40

Space for rough work

DIRECTIONS (Q. Nos. 72-74) : Find the odd number/letters/ number pair from the given alternatives.

72. (A) AZBY (B) CXDW (C) EVFU (D) TGSH
 73. (A) 1 0 1 (B) 2 1 2 (C) 3 2 6 (D) 1 1 1
 74. (A) 12 – 144 (B) 13 – 156 (C) 15 – 180 (D) 16 – 176

DIRECTIONS : (75-76) Select the missing number from the given responses.

75.

14	10	22
2	3	4
7	3	11
4	10	?

- (A) 2 (B) 4 (C) 6 (D) 8

76.

6	8	7
36	64	49
24	48	35
18	24	?

- (A) 17 (B) 18 (C) 19 (D) 21

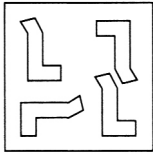
DIRECTIONS (Q. Nos. 77-78) : Find out the wrong number in the series.

77. 17, 23, 31, 41, 53, 69
 (A) 23 (B) 31 (C) 41 (D) 69
 78. 27, 81, 1331, 125
 (A) 125 (B) 27 (C) 1331 (D) 81

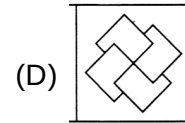
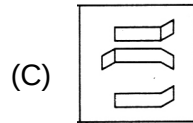
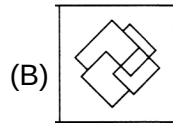
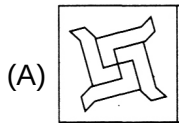
Space for rough work

79. Identify the answer figure from which the pieces given in the question figure have been cut.

Question Figure

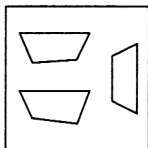


Answer figure

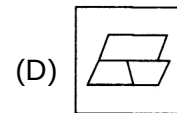
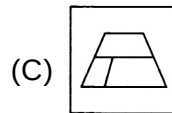
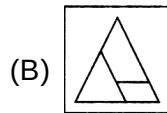
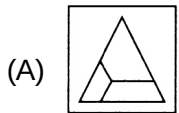


DIRECTIONS : In which among the answer figures can be constructed from the parts given in question figure?

80. **Question Figure**



Answer figure



Space for rough work

ANSWER - KEY**PART- A : PHYSICS**

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

PART- B : CHEMISTRY

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

PART- C : MATHEMATICS

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

PART- D : MENTAL ABILITY

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