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STaRT-2012

SAMPLE TEST PAPER

CLASS-XI (SC.-MATHS)

Time : 90 min.

Maximum Marks : 200

GENERAL INSTRUCTIONS

1. The question paper contains 50 questions, 15 questions from Physics (1-15), 10 questions from Chemistry (16-25), 15 Questions from Mathematics (26-40) and 10 questions from Mental Ability (41-50).
2. The OMR sheet given in the examination hall is the Answer Sheet.
3. Blank papers, clip boards, log tables, slide rule, calculators, mobile or any other electronic gadgets in any form is not allowed.
4. Do not forget to mention your roll number neatly and clearly in the blank space provided in the answer sheet.
5. Each Question carries 4 marks. '1' mark will be deduct for each wrong answer. So attempt each question carefully.
6. No rough sheets will be provided by the invigilators. All the rough work is to be done in the blank space provided in the question paper.
7. In case of any dispute, the answer filled in the OMR sheet available with the institute shall be final.

Name : _____ Roll No. : _____

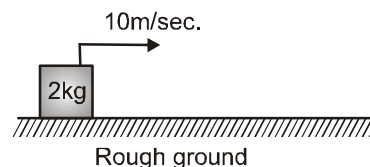
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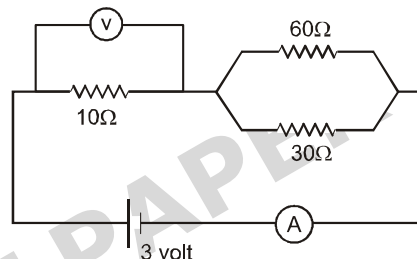
1. A block of mass 2 kg is given an initial velocity of 10 m/sec. on a rough horizontal ground. Due to the friction, the block comes to the rest after travelling 5m distance. What should be the constant friction force acting on the block?



- (A) 10 N (B) 20 N (C) 30 N (D) 40 N

2. In the circuit shown, reading of the ammeter and the voltmeter are respectively :

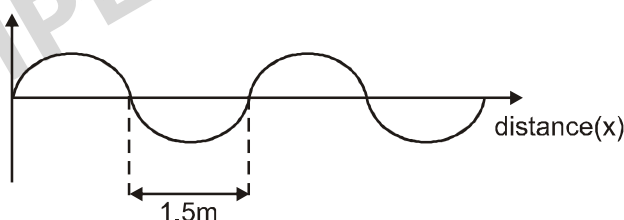
- (A) 0.1 amp., 3 volt
(B) 0.1 amp., 1 volt
(C) 0.3 amp., 3 volt
(D) 0.3 amp., 1 volt



3. A 100 gm bullet is fired in forward direction with a velocity of 100 m/sec. Due to this, the free gun of mass 2 kg (excluding bullet) rebounds in backward direction. Total kinetic energy produced in this process is :
(A) 500 J (B) 25 J (C) 525 J (D) 475 J

4. The graph of pressure excess v/s distance (x) for a sound wave is shown above. If the speed of sound is 300 m/sec, the time period of the vibration in the sound wave is :

Pressure excess

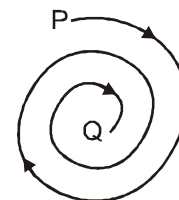


- (A) 1 sec./vibration (B) 0.1 sec./vibration (C) 0.01 sec./vibration (D) 100 sec./vibration

5. A candle is used as an object and placed at a distance of 30 cm from a lens of power 5D (power may be positive or negative). At how much distance from the lens, should we place a screen, so that a sharp and inverted image of the candle can be formed :

- (A) 30 cm (B) 40 cm (C) 50 cm (D) 60 cm

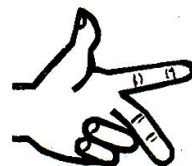
6. A motorcycle is moving along the path shown with constant speed 60 km/h. It takes two minutes to move from point P to point Q. The total length of the path from P to Q will be :



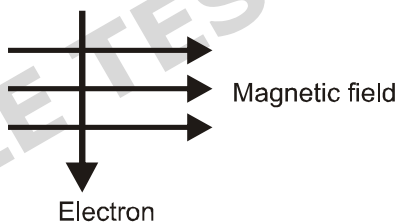
- (A) 2 km (B) 3 km (C) 4 km (D) 5 km

Space For Rough Work

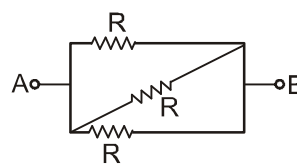
7. Suppose a positive charge is moving with a velocity $\vec{v}$ in a magnetic field $\vec{B}$, and experiences a magnetic force $\vec{F}$. According to the Fleming's left hand rule, the fore-finger, the central finger and the thumb will respectively point towards :



- (A) $\vec{B}$, $\vec{v}$ and $\vec{F}$ (B) $\vec{v}$, $\vec{B}$ and $\vec{F}$
(C) $\vec{F}$, $\vec{v}$ and $\vec{B}$ (D) None of these
8. Which of the following objects will float in water :
(A) mass = 50 g and volume = 20 cm³ (B) mass = 200 g and volume = 500 cm³
(C) mass = 40 g and volume = 20 cm³ (D) mass = 1 g and volume = 0.5 cm³
9. A cubical block is projected horizontally on a rough surface with speed v and it stops sliding after displacement 'x' when it is projected with speed $2v$, displacement of the block before it stops sliding will be :
(A) x (B) 2x (C) 4x (D) 0.5 x
10. 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
11. Which of the following lenses would you prefer to use while reading small letters found in a dictionary. lens is kept just above the dictionary ?
(A) A convex lens of focal length 50 cm (B) A concave lens of focal length 40 cm
(C) A convex lens of focal length 5 cm (D) A concave lens of focal length 5 cm
12. Equivalent resistance between A and B is :
(A) 2R (B) $\frac{R}{2}$
(C) $\frac{R}{3}$ (D) $\frac{3R}{2}$



13. Two particles P and Q start from rest and move for equal time on a straight line. Particle P has an acceleration of $X \text{ m/s}^2$ for the first half of the total time and $2X \text{ m/s}^2$ for the second half. The particle Q has an acceleration of $2X \text{ m/s}^2$ for the first half of the total time and $X \text{ m/s}^2$ for the second half. Which particle has covered larger distance?
(A) both have covered the same distance (B) P has covered the larger distance
(C) Q has covered the larger distance (D) none of these

Space For Rough Work



14. The minimum work done to accelerate a block on a smooth horizontal surface from rest to speed v
(A) is less than that required to accelerate it from v to $2v$.
(B) is equal than that required to accelerate it from v to $2v$.
(C) is more than that required to accelerate it from v to $2v$.
(D) may be any one of the above since it depends on the force acting on the truck and the distance over which it acts.
15. Three resistance of value 1Ω , 2Ω and 3Ω are connected in parallel. If the effective resistance of the circuit has to be 1Ω , the value of the resistance to be connected in series to this circuit should be :
(A) $\frac{6}{11}\Omega$ (B) $\frac{5}{11}\Omega$ (C) $\frac{4}{11}\Omega$ (D) $\frac{3}{11}\Omega$
16. Which of following is responsible for temporary hardness of water ?
(A) $\text{Ca}(\text{HCO}_3)_2$ (B) Na_2CO_3 (C) CaCO_3 (D) MgSO_4
17. A solution turns red litmus blue, its pH is likely to be :
(A) 1 (B) 4 (C) 7 (D) 10
18. An atom which has a mass number of 15 and has 7 neutrons is an :
(A) isomer of nitrogen (B) isobar of oxygen (C) isotope of oxygen (D) isobar of carbon
19. 10 mL of a solution of NaOH is found to be completely neutralised by 8 mL of a given solution of HCl. If we take 20 mL of the same solution of NaOH, the amount of H_2SO_4 solution (having the same molarity as that of initial HCl solution) required to neutralise it will be :
(A) 4 mL (B) 8 mL (C) 12 mL (D) 16 mL
20. Choose the correct statement with regard to redox displacement reactions.
(A) A less active metal displaces a more active metal.
(B) A more active non-metal is displaced by a less active non metal.
(C) A less active non-metal displaces hydrogen from dilute acids.
(D) A more active metal displaces hydrogen from dilute acids.
21. Element X forms a chloride with the formula XCl_2 , which is a solid with a high melting point. X would most likely be in the same group of the Periodic Table as ?
(A) Na (B) Ca (C) Al (D) Si
22. Which of the following statements is not a correct statement about the trends when going from left to right across the periods of periodic Table -
(A) The atoms generally become smaller in size.
(B) The number of valence electrons increases.
(C) The atoms lose their electrons more easily.
(D) The oxides become more acidic.
23. Consider the following equilibrium situation and identify the correct statement :
$$2\text{H}_2(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{CH}_3\text{OH}(\text{g})$$

(A) Addition of $\text{H}_2(\text{g})$ would lead to increased production of $\text{CH}_3\text{OH}(\text{g})$.

Space For Rough Work



- (B) Addition of CH_3OH (g) would stimulate further consumption of CO (g).
(C) Increasing pressure would lead to the production of H_2 (g).
(D) Reducing the volume of the equilibrium will not disturb the equilibrium.
24. 3 moles of an ideal gas occupies 100L under certain conditions. 1.5 moles of the gas is removed and the temperature of the gas is doubled keeping the pressure constant. What is the new volume of the gas ?
(A) 50L (B) 200L (C) 400L (D) 100L
25. Decomposition reaction of ammonia is given as $2\text{NH}_3 \longrightarrow \text{N}_2 + 3\text{H}_2$. The concentration of NH_3 decreases to 40% in 10 min starting with 0.1mol/L. The average rate of decomposition of NH_3 in $\text{mol L}^{-1} \text{min}^{-1}$ is :
(A) 6×10^{-3} (B) 4×10^{-3} (C) 4×10^{-2} (D) 6×10^{-2}
26. If x is a whole number, then $x^2(x^2 - 1)$ is always divisible by :
(A) 12 (B) 24 (C) $12 - x$ (D) 18
27. 'P + Q' means 'P is the brother of Q'. 'P - Q' means P is the mother of Q and 'P $\times$ Q' means 'P is the sister of Q'. Which of the following means that M is the maternal uncle of R ?
(A) $M - R + K$ (B) $M + K - R$ (C) $M + K \times Q$ (D) $M - K + R$
28. A leak in the bottom of a fully filled water tank empties it in 6 hours. However the leak empties the fully filled water tank in 8 hours when a pipe is delivering water into the tank at the rate of 4 L/min. What is the capacity of the tank ?
(A) 5,260 L (B) 5,760 L (C) 5,846 L (D) 6,670 L
29. A father's age is equal to the sum of the ages of his 3 children. In 9 years his age will be equal to the sum of the two eldest son's ages and 3 years after that his age will be equal to the sum of the ages of his eldest and youngest children. Again 3 years after that his age will be equal to the sum of the ages of his two youngest children. find the father's present age ?
(A) 32 years (B) 36 years (C) 40 years (D) 44 years
30. The number of roots of the equation $x - \frac{2}{(x-1)} = 1 - \frac{2}{(x-1)}$ is :
(A) 0 (B) 1 (C) 2 (D) infinite
31. If $\frac{1}{3} \log_3 M + 3 \log_3 N = 1 + \log_{0.008} 5$, then :
(A) $M^9 = \frac{9}{N}$ (B) $N^9 = \frac{9}{M}$ (C) $M^3 = \frac{3}{N}$ (D) $N^9 = \frac{3}{M}$
32. Angle between the minute hand of a clock and hour hand when the time is 7 : 20 am is :
(A) 80° (B) 100° (C) 120° (D) 90°

Space For Rough Work

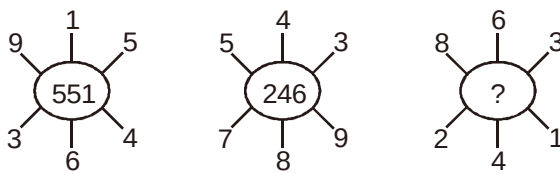


33. If $x \sin^3 \theta + y \cos^3 \theta = \sin \theta \cos \theta$ and $x \sin \theta = y \cos \theta$ then :
(A) $x^3 + y^3 = 1$ (B) $x^2 - y^2 = 1$ (C) $x^2 + y^2 = 1$ (D) $x^3 - y^3 = 1$
34. If $\frac{x}{y} = \frac{3}{4}$, then the incorrect expression of the following is
(A) $\frac{x+y}{y} = \frac{7}{4}$ (B) $\frac{y}{y-x} = \frac{4}{1}$ (C) $\frac{x+2y}{x} = \frac{11}{3}$ (D) $\frac{x-y}{y} = \frac{1}{4}$
35. If $f(a) = a - 2$, $f(a, b) = b^2 + a$, then the value of $f[3, f(4)]$ is
(A) $a^2 - 4a + 7$ (B) 28 (C) 7 (D) 8
36. If the ratio of the legs of a right triangle is 1 : 2, then the ratio of the corresponding segments of the hypotenuse made by a perpendicular upon it from the vertex is
(A) 1 : 4 (B) 1 : $\sqrt{2}$ (C) 1 : 2 (D) 1 : $\sqrt{15}$
37. The sum of all the roots of $4x^3 - 8x^2 - 63x - 9 = 0$ is
(A) 8 (B) 2 (C) -8 (D) -2
38. The value of $\left(\frac{1}{16}\right)a^0 + \left(\frac{1}{16a}\right)^0 - 64^{-1/2} - (-32)^{-4/5}$ is
(A) $1\frac{13}{16}$ (B) $1\frac{3}{16}$ (C) $\frac{7}{8}$ (D) $\frac{1}{16}$
39. If $\sin x = 3 \cos x$, then $\sin x \cos x$ equals
(A) 1/6 (B) 1/5 (C) 1/3 (D) 1/4
40. If X is a point on the line AB and Y, Z are points (not on the line) such that $\angle AXY = 45^\circ$ and $\angle YXZ = 60^\circ$, then $\angle AXZ$ is equal to
(A) 105° (B) 120° (C) 135° (D) 150°

Directions : (41 to 43) Find the missing term :

41. 151, 158, 172, 182, ?
(A) 210 (B*) 193 (C) 197 (D) 203
42. EIO, IOU, OUA, ?
(A) UAD (B) UAK (C) UAL (D*) UAE

Space For Rough Work

43. 
(A) 262 (B) 622 (C) 631 (D) 631

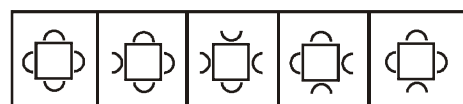
Directions : (44 to 45) Column I contains five capital letters while column II contains five digits. Each letter corresponds to a single digit but not necessarily in that order.

स्तम्भ (column) I	स्तम्भ (column) II
BEIKL	61520
PNBTK	34568
XLPBE	57401
KNIXV	27396
XBNPE	45713

44. What is the value of BIKE ?
(A*) 5261 (B) 6125 (C) 2560 (D) None of these
45. What is the value of PIN + NIP ?
(A) 423 (B) 744 (C) 777 (D*) 747
46. In a row of girls, Rina and Mona occupy the ninth place from the right end and tenth place from the left end, respectively. If they interchanged their places, Rina and Mona occupy seventeenth place from the right and eighteenth place from the left, respectively. How many girls are there in the row ?
(A) 25 (B*) 26 (C) 27 (D) Data inadequate
47. At what time between 4 and 5 will the hands of clock be in opposite direction ?
(A) $53\frac{7}{11}$ min. past 4 (B) $21\frac{9}{11}$ min. past 4 (C*) $54\frac{6}{11}$ min. past 4 (D) $49\frac{1}{11}$ min. past 4

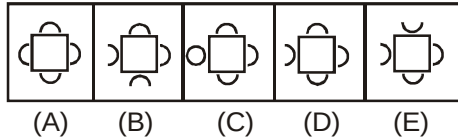
Directions : (48 to 49) Each of the following questions consists of five figures marked 1, 2, 3, 4 and 5. These figures form a series. Find out the one from the answer figures that will continue the series.

Problem Figures

48. 
(1) (2) (3) (4) (5)

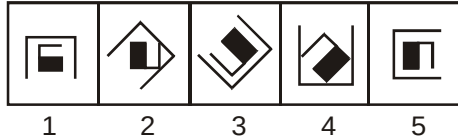
Answer Figures

Space For Rough Work

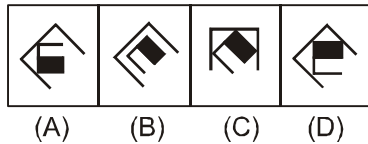


Problem Figures

49.



Answer Figures



50. On the basis of the following figures you have to tell which number will come in place of ‘?’



(i)



(ii)



(iii)

(A) 2

(B*) 3

(C) 6

(D) 4

ANSWER

1. (B) 2. (B) 3. (C) 4. (C) 5. (D) 6. (A) 7. (A) 8. (B)
9. (C) 10. (D) 11. (C) 12. (C) 13. (C) 14. (A) 15. (B) 16. (A)
17. (D) 18. (C) 19. (B) 20. (D) 21. (B) 22. (C) 23. (A) 24. (D)
25. (A) 26. (A) 27. (B) 28. (B) 29. (B) 30. (A) 31. (B) 32. (B)
33. (C) 34. (D) 35. (C) 36. (A) 37. (B) 38. (C) 39. (D) 40. (A)
41. (B) 42. (D) 43. (B) 44. (A) 45. (D) 46. (B) 47. (C) 48. (D)
49. (D) 50. (B)