MENIIT

NEET • IIT-JEE

MTSE

MENIIT TALENT SEARCH EXAM

2024

MTSE SAMPLE PAPER

Standard - XI
(Moving to Standard - XII)

Code : DE-SP

MERIT & APTITUDE TEST
(CODE: DE)

Time: 90 Minutes   **Maximum Marks: 220**

Instructions

(A)   GENERAL

1.   This booklet is your Question Paper. It contains **FOUR sections. Section-(A) has 12 questions of Physics, Section-(B) has 12 questions of Chemistry, Section-(C) has 16 questions of Mathematics and Section-(D) contains 15 questions from Mental Aptitude.**

2.   This booklet contains **55 questions of four mark each in all**. All the questions are COMPULSORY.

3.   Blank papers, clip boards, log tables, slide rule, calculators, cellular phones and electronic gadgets in any form, are not allowed.

4.   Write your **Name and Roll No**. in the space provided at the bottom of this sheet.

(B)   FILLING IN THE OMR SHEET

5.   On the OMR sheet, **write in ink** your Name, Roll No., name of the centre and put your signature in the appropriate boxes.

6.   Every question has **four choices** for its answer (A), (B), (C) & (D). Only **one** of them is the right answer.

7.   On the OMR sheet, for each question number, darken **only one** bubble with pen only corresponding to what you consider to be the most appropriate answer.

(C)   MARKING SCHEME

8.   (i)   You will be awarded **4 marks** if you have darkened the bubble corresponding to the right answer.

      (ii)   In case you have darkened the wrong bubble, **1 mark will be deducted** for that response. **There is NEGATIVE MARKING for all incorrectly marked responses.**


|	
Name of the Candidate :	☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
Roll Number :	☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
Date of Examination :	☐☐☐☐ ***Centre:*** ☐☐☐☐☐☐☐☐☐

SECTION – (A) PHYSICS

1. A wire is of mass $(0.3 \pm .003)$ gm. The radius is (0.5 ± 0.005) cm and length is $(6 \pm .06)$ cm. The maximum percentage error in density is -

   (a) 3% (b) 4% (c) 8% (d) 16%

2. A golfer standing on level ground hits a ball with a velocity of u = 52 m/s at an angle □ above the horizontal. If tan□ = 5/12, then the time for which the ball is at least 15m above the ground (i.e. between A and B) will be (take g = 10 m/s^2) –
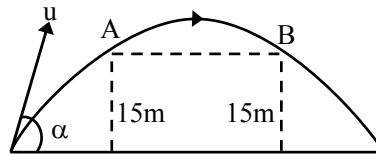

   (a) 1 sec (b) 2 secs (c) 3 secs (d) 4 secs

3. From the top of a tower of height h a body of mass m is projected in the horizontal direction with a velocity v, it falls on the ground at a distance x from the tower. If a body of mass 2m is projected from the top of another tower of height 2h in the horizontal direction so that it falls on the ground at a distance 2x from the tower, the horizontal velocity of the second body is -

   (a) 2v (b) $\sqrt{2}$ V (c) $\dfrac{V}{2}$ (d) $\dfrac{V}{\sqrt{2}}$

4. A sphere of mass m is held between two smooth inclined walls. For sin 37º = 3/5, the normal reaction of the wall (2) is equal to -


   (a) mg (b) mg sin 74º
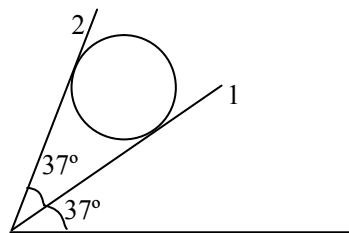
   (c) mg cos 74º (d) None of these

5. Two blocks are connected by a massless string through an ideal pulley as shown. A force of 22N is applied on block B when initially the blocks are at rest. Then speed of centre of mass of block A and block B, 2 secs, after the application of force is (masses of A and B are 4 kg and 6 kg respectively and surfaces are smooth)
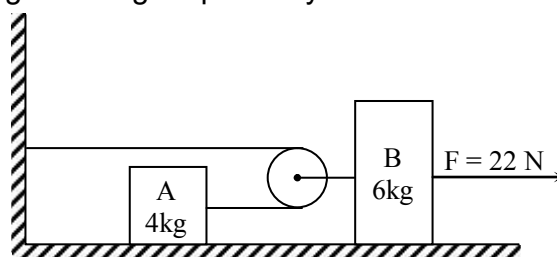

   (a) 1.4 m/s^2 (b) 1 m/s^2 (c) 2 m/s^2 (d) None of these

6. A rod of length L is sliding such that one of its ends is always in contact with a vertical wall and its other end is always in contact with horizontal surface. Just after the rod is released from rest, the magnitude of acceleration of rod at this instant will be:
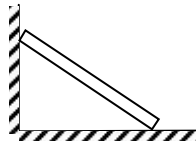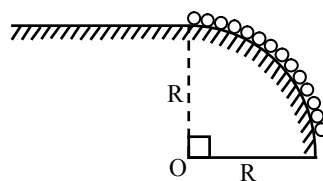
(a) $\dfrac{a+b}{\ell}$

(b) $\dfrac{\sqrt{|a^2-b^2|}}{\ell}$

(c) $\dfrac{\sqrt{a^2+b^2}}{\ell}$

(d) None of these

7. A body of mass m is hauled up the hill with constant speed v by a force such that the force at each point is directed along the tangent to the path. The length of base of hill is L and its height is h. The coefficient of friction between the body and path is μ. Then which of the following statement is incorrect when body moves from bottom to top?
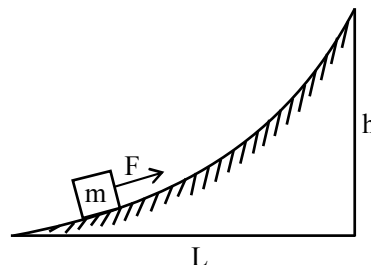
(a) work done by gravity is –mgh

(b) work done by friction is – μmgL

(c) work done by gravity is path independent

(d) None of the above

8. Power applied to a particle varies with time as P = [3t^2 – 2t + 1] watts. Where t is time in seconds. Then the change in kinetic energy of particle between time t = 2s to t = 4s is:

(a) 46 J   (b) 52 J   (c) 92 J   (d) 104 J

9. A chain of length $\lambda < \pi R/2$ is placed on a smooth surface whose some part is horizontal and some part is quarter circular of radius R as shown. Initially the whole part of chain lies in the circular part with one end at top most point of circular surface. If the mass of chain is m then the work required to pull very slowly the whole chain on horizontal part is:

(a) $\dfrac{m}{\ell}gR^2\left[\sin\left(\dfrac{\ell}{R}\right)\right]$

(b) $\dfrac{m}{\ell}gR^2\left[\cos\left(\dfrac{\ell}{R}\right)\right]$

(c) $\dfrac{m}{\ell} gR^2\left[\left(\dfrac{\ell}{R}\right) - \sin\left(\dfrac{\ell}{R}\right)\right]$ (d)   None of these

10. One end of a uniform rod of length *l* and mass m is hinged at A. It is released from rest from horizontal position AB as shown in figure. The force exerted by the rod on the hinge when it becomes vertical is:
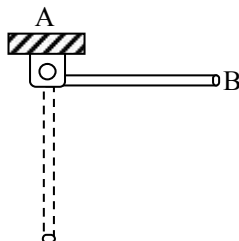
(a) $\dfrac{3}{2}$ mg   (b) $\dfrac{5}{2}$ mg   (c) 3 mg   (d) 5 mg

11. A solid sphere of mass M and radius R is placed on a smooth horizontal surface. It is given a horizontal impulse J at a height h above the centre of mass and sphere starts rolling then, the value of h and speed of centre of mass are:
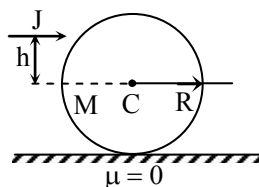
(a) h = $\dfrac{2}{5}$ R and v = $\dfrac{J}{M}$ (b) h = $\dfrac{2}{5}$ R and v = $\dfrac{2}{5}\dfrac{J}{M}$

(c) h = $\dfrac{7}{5}$ R and v = $\dfrac{7}{5}\dfrac{J}{M}$ (d) h = $\dfrac{7}{5}$ R and v = $\dfrac{J}{M}$

12. A loop of radius 3 meter and weighs 150 kg. It rolls along a horizontal floor so that its centre of mass has a speed of 15 cm/sec. How much work has to be done to stop it?
(a) 3.375 J   (b) 7.375 J   (c) 5.375 J   (d) 9.375 J

SECTION – (B)   CHEMISTRY

13. For the reaction A + 2B $\longrightarrow$ C, 1 moles of A and 4 moles of B will produce
(a) 5 moles C   (b) 2 moles C   (c)   1 moles C   (d)   13 moles C

14. What amount of CaO is produced by oxidation of 20 g calcium? (Atomic mass of Ca = 40u)
(a) 14 g   (b) 1.4 g   (c)   28 g   (d)   5.6 g

15. Carbon is found to form two oxides, which contains 42.9% and 27.3% of carbon respectively. The law shown by above data

(a) Law of constant proportion   (b)   Law of multiple proportions

(c) Law of reciprocal proportions   (d)   Law of conservation of mass

16. If helium atom and hydrogen molecule are moving with the same velocity, their wavelength ratio will be
(a) 4: 1   (b) 1: 2   (c)   2: 1   (d)   1: 4

17. A photon having a wavelength of 845 Å, causes the ionisation of N-atom, what is the ionisation energy of N?

(a) 1.4 kJ/mol

(b) 1.4×10^4 kJ/mol

(c) 1.4×10^2 kJ/mol

(d) 1.4×10^3 kJ/mol

18. Which set of quantum number is not consistent with the quantum mechanical theory?

(a) n = 2, l = 1, m = 1, s = +1/2

(b) n = 4, l = 3, m = 2, s = −1/2

(c) n = 3, l = 2, m = 3, s = +1/2

(d) n = 4, l = 3, m = 3, s = +1/2.

19. An ionic compound A^+B^- is most likely to be formed when

(a) The ionization energy of A high and electron affinity of B is low

(b) The ionization energy of A is low and electron affinity of B is high

(c) Both, the ionization energy of A and electron affinity of B is high

(d) Both, the ionization energy of A and electron affinity of B are low

20. Pair of species having identical shape for the molecules

(a) CF_4, SF_4 (b) BF_3, PCl_3 (c) XeF_2, CO_2 (d) PF_5, IF_7

21. A covalent molecule AB_4 (not a complex) will have which of the following hybridization if it is square planar.

(a) sp^3

(b) sp^3d

(c) sp^3d^2

(d) dsp^2

22. Molar heat capacity of aluminium is 25 $JK^{-1}mol^{-1}$. The heat necessary to raise the temperature of 54 g of aluminium from 30°C to 50°C is:

(a)   1.5 kJ   (b)   0.5 kJ   (c)   1.0 kJ   (d)   2.5 kJ

23. Which one of the following is the smallest in size?

(a) N^{3-}

(b) O^{2-}

(c) F^-

(d) Na^+

24. The first ionization potential of Na, Mg. Al and Si are in the order

(a) Na < Mg > Al < Si

(b) Na > Mg > Al > Si

(c) Na < Mg < Al > Si

(d) Na > Mg > Al < Si

SECTION – (C)   MATHEMATICS

25. If $\sin\theta + \csc\theta = 2$ then $\sin^n\theta + \csc^n\theta$ is equal to:

(a)   1   (b)   3   (c)   2   (d)   None of these

26. The value of cos 9° − sin 9° is:

(a) $\dfrac{5 + \sqrt{5}}{4}$

(b) $\dfrac{\sqrt{5 - \sqrt{5}}}{2}$

(c) $-\dfrac{\sqrt{5-\sqrt{5}}}{2}$ (d)   None of these

27. The greatest coefficient in the expansion of $\left(1+\dfrac{2x}{3}\right)^{15}$ is:

(a) $^{15}C_7$ (b) $^{15}C_6\left(\dfrac{2}{3}\right)^6$ (c) $^{15}C_8$ (d) $^{15}C_7\left(\dfrac{2}{3}\right)^7$

28. In a town of 10000 families it was found that 40% families buy newspaper A, 20% families buy newspaper B and 10% families buy newspaper C, 5% families buy A and B, 3% buy B and C and 4% buy A and C. and C. If 2% families buy all the three newspapers. Then of families which buy A only are:

(a) 3100   (b) 3300   (c) 2900   (d) 1400

29. If $\alpha \neq \beta$, but $\alpha^2 = 5\alpha - 3$ and $\beta^2 = 5\beta - 3$ then the equation whose roots are α / β and β / α is:

(a) $3x^2 - 25x + 3 = 0$ (b) $x^2 + 5x - 3 = 0$

(c) $x^2 - 5x + 3 = 0$ (d) $3x^2 - 19x + 3 = 0$

30. If (a, b), (c, d), (e, f) are vertices of a triangle, such that a, c, e are in GP with common ratio 'r' & b, d, f are in GP with common ratio 's', then the area of the triangle is:

(a) $|\dfrac{1}{2}ab\,(r-s)\,(1+r)\,(1+s)|$ (b) $|\dfrac{1}{2}ab\,(s-r)\,(r-1)\,(s-1)|$

(c) $|\dfrac{1}{2}abrs^2|$ (d)   None of these

31. In a certain test, there are 'n' questions. In this test 2^k students gave wrong answers to at least (n – k) questions, where k = 0,1,2,……,n. If total number of wrong answers is 4095, then value of n is

(a) 11   (b) 10   (c) 13   (d) None of these

32. In the expansion of $(1+x)^n$ coefficient of 14th, 15th, 16th term are in A.P. then 'n' equals:

(a) 23   (b) 43   (c) 20   (d) None of these

33. If the points A(x_1, y_1), B(x_2, y_2), C(x_3, y_3) are such that x_1, x_2, x_3 and y_1, y_2, y_3 are in A.P. then

(a) A, B, C are concyclic   (b) A, B, C are collinear

(c) A, B, C are vertices of an equilateral triangle

(d)   None of these

34.   The first term of an AP of consecutive integers is $(p^2 + 1)$. The sum of $(2p + 1)$ terms of this series can be expressed as:

(a) $(p + 1)^2$ (b) $(2p + 1)(p + 1)^2$

(c) $(p + 1)^3$ (d) $p^3 + (p + 1)^3$

35.   The number of positive integers ($< 1, 00, 000$) which contain exactly one 2, one 5, and one 7, is:

(a)   2940   (b)   7350   (c)   2157   (d)   1582

36.   There are 10 bags B_1, B_2,….,B_{10} ; which contain 21, 22, …..30 different articles respectively. The total number of ways to bring out 10 articles from a bag is:

(a) $^{31}C_{20}-^{21}C_{10}$ (b) $^{31}C_{21}$

(c) $^{31}C_{20}$ (d)   None of these

37.   If α, β are the roots of the equation $ax^2 + bx + c = 0$, then the roots of the equation $ax^2 + bx (x + 1) + c(x + 1)^2 = 0$ are:

(a) $\alpha - 1, \beta - 1$ (b) $\alpha + 1, \beta + 1$

(c) $\dfrac{\alpha}{\alpha-1}, \dfrac{\beta}{\beta-1}$ (d) $\dfrac{\alpha}{1-\alpha}, \dfrac{\beta}{1-\beta}$

38.   The equations $ax^2 + bx + c = 0$ and $x^2 + 2x + 3 = 0$ have one root in common, then:

(a) $a : b : c = 1 : 2 : 3$ (b) $a : b : c = 3 : 2 : 1$

(c) $a : b : c = 1 : 3 : 2$ (d)   None of these

39.   If α, β are the roots of the equation $2x^2 + 4x - 5 = 0$, the equation whose roots are the reciprocals of $2\alpha - 3$ and $2\beta - 3$ is:

(a) $x^2 + 10x - 11 = 0$ (b) $x^2 + 10x + 11 = 0$

(c) $11x^2 + 10x + 1 = 0$ (d) $11x^2 - 10x + 1 = 0$

40.   In the expansion of $(1 + x)^{101}.(1- x + x^2)^{100}$ coefficient of x^{50} is:

(a)   459   (b)   101   (c)   0   (d)   157

SECTION – (D)   APTITUDE

41.   The number have been arranged according to an identical pattern. Find out the missing numbers:

| 3		48
	72	
?		9
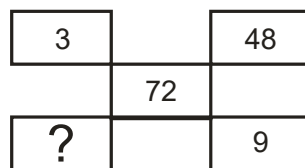
(a) 12   (b) 16   (c) 32   (d) 24

42. Choose the missing word in place of sign? On the basis of the relationship between the words given on the left / right hand side of sign:

    'Cell' is related to 'Tissue' in the same way as 'Tissue' is related to:

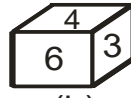   (a) Object   (b) Ear   (c) Organ   (d) Limb

43. The figure (A) given below is the unfolded position of a cubical dice. In each of the following questions this unfolded figure is followed by four different figures of dice. You have to select the figure which is identical to the figure (A)
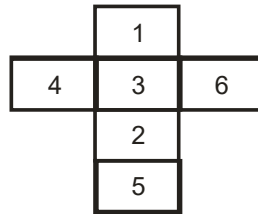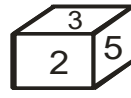

(A)
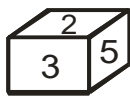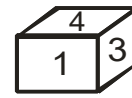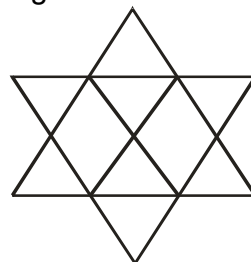

(a)   (b)   (c)   (d)

44. If AMERICA is coded as RAIMCEA, BRITAIN is coded as TBARIIN, INDIA will be coded as:

    (a) DINIA   (b) DIINA   (c) DINAI   (d) IIDNA

45. If REACHING TOMORROW is coded as HOJIDBFS XPSSPNPU, UIHJMG EFZBMFE means:

    (a) TRAINS DELAYED   (b) FLIGHT DELAYED

    (c) CANCEL JOURNEY   (d) FLIGHT CANCEL

46. Determine the number of pentagons in the following figures:

(a) 5   (b) 6   (c) 8   (d) 10

47. Choose the pair/groups of words that show the same relationship as given in the pair/group.

    Colours : Eyes

    (a) Vision : Spectacles   (b)   Print   : Newspaper

    (c) Medicine : Ailment   (d) Fragrance : Nose

48. On what dates of December, 1984 did Sunday fall?

    (a) 6th , 13th , 20th & 27th   (b) 7th, 14th , 21th & 28th

    (c) 2nd , 9th , 16th , 23rd & 30th   (d) 1st, 8th, 15th & 22nd

49. At what time between 5 and 6 are the hands of a clock coincident?

    (a) 22 minutes past 5   (b) 30 minutes past 5

    (c) $22\dfrac{8}{11}$ minutes past 5   (d) $27\dfrac{3}{11}$ minutes past 5

50. Pointing towards a boy, Aruna said to Pushpa, "The mother of his father is the wife of your grandfather (Mother's father)". How Pushpa is related to that boy?

    (a) Sister   (b) Niece   (c) Cousin sister   (d) Wife

51. If L denotes ÷, M denotes ×, P denotes + and Q denotes –, then which of the following statement is true?

(a) 32 P 8 L 16 Q 4 = $-\dfrac{3}{2}$ (b) 6 M 18 Q 26 L 13 P 7 = $\dfrac{173}{13}$

(c) 11 M 34 L 17 Q 8 L 3 = $\dfrac{38}{3}$ (d) 9 P 9 L 9 Q M 9 = –71

52. In a certain code, CRATES is written as '• + ★ ÷ $ #' and BEAT is written as '@ $ ★ ÷'. How is CARS written in that code?

(a) # • ★ ÷   (b) ★ • + #

(c) • ★ + #   (d) • ★ ÷ $

53. Complete the series: 1, 7, 11, 13, 13, 11, ?

(a) 12   (b) 7

(c) 9   (d) 10

54. Complete the series: 4, 3, 5, 6, 8, 7, 11, 10, 12, 13 ?

(a) 14   (b) 17

(c) 13   (d) 15

55. Which pair is different from the other three?

(a) Air : Breathe   (b) Food : Prepare

(c) Water : Drink   (d) Tea : Sip

★ ★ ★ ★ ★

ANSWER KEY | SAMPLE PAPER (ENGG)

Standard XI (Moving to Standard XII) • (Code : DE-SP)

1.	(b)	20.	(c)	39.	(c)
2.	(b)	21.	(c)	40.	(c)
3.	(b)	22.	(c)	41.	(a)
4.	(a)	23.	(d)	42.	(c)
5.	(a)	24.	(a)	43.	(d)
6.	(c)	25.	(c)	44.	(b)
7.	(b)	26.	(b)	45.	(b)
8.	(a)	27.	(b)	46.	(d)
9.	(c)	28.	(b)	47.	(d)
10.	(b)	29.	(d)	48.	(c)
11.	(a)	30.	(b)	49.	(d)
12.	(a)	31.	(d)	50.	(c)
13.	(c)	32.	(a)	51.	(d)
14.	(c)	33.	(b)	52.	(c)
15.	(b)	34.	(d)	53.	(d)
16.	(b)	35.	(a)	54.	(c)
17.	(d)	36.	(a)	55.	(b)
18.	(c)	37.	(d)		
19.	(b)	38.	(a)		