MENIIT

NEET • IIT-JEE

MTSE

MENIIT TALENT SEARCH EXAM

2024

MTSE SAMPLE PAPER

Standard - XI
(Moving to Standard - XII)

Code : DM-SP

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MERIT & APTITUDE TEST
(CODE: DM)

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 Biology 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.

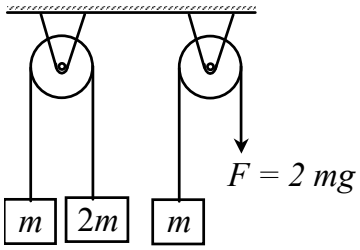
(C) MARKING SCHEME

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. The pulley arrangements shown in the figure are identical, the mass of the rope being negligible. In case (a) mass m is lifted by attaching a mass of 2 m to the other end of the rope. In case (b) the mass m is lifted by pulling the other end of the rope with a constant downward force $F = 2\ mg$, where g is the acceleration due to gravity. The acceleration of mass m in case is



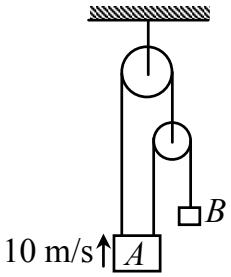
(a) zero

(b) more than that in case (b)

(c) less than that in case (b)

(d) equal to that in case (b)

2. At a certain moment of time velocity of A is 10 m/s upward. The velocity of B at that time will be



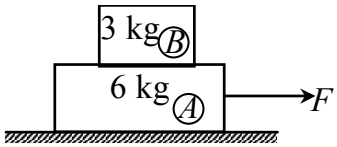
(a) 30 m/s downward

(b) 20 m/s downward

(c) 10 m/s down ward

(d) 5 m/s down ward

3. Two blocks A and B of masses 6 kg and 3 kg rest on a smooth horizontal surface as shown in figure. If coefficient of friction between A and B is 0.4. The maximum horizontal force, which is applied on block A to avoid relative motion between A and B is: (g = 10 m/s^2)



(a) 72 N (b) 40 N (c) 36 N (d) 20 N

4. A person is standing in a stationary lift drops a coin from a certain height h. It takes time t to reach the floor of the lift. If the lift is rising with a uniform acceleration a, the time taken by the coin (dropped from the same height h) to reach the floor will be

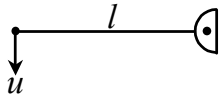
(a) t

(b) $t\sqrt{\frac{a}{g}}$

(c) $t\left(1+\frac{a}{g}\right)^{-\frac{1}{2}}$

(d) $t\left(1-\sqrt{\frac{a}{g}}\right)^{\frac{1}{2}}$

5. A ball of mass m is attached to one end of a light rod of length l, the other end of which is hinged. What minimum velocity u



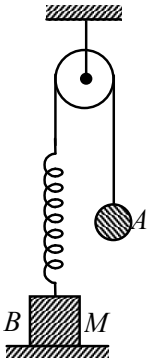
should be imparted to the ball downwards, so that it can complete the circle.

(a) $\sqrt{gl}$ (b) $\sqrt{5gl}$ (c) $\sqrt{3gl}$ (d) $\sqrt{2gl}$

6. Power supplied to a particle of mass 2 kg varies with time as $P = \frac{3t^2}{2}$ watt. Here *t* is in second velocity of particle at t = 0 is v = 0. The velocity of particle at time t = 2s will be

(a) 1 m/s (b) 4 m/s (c) 2 m/s (d) $2\sqrt{2}$ m/s

7. In the figure, the ball *A* is released from rest when the spring is at its natural (unstretched) length. For the block *B* of mass *M* to leave contact with the ground at some stage, the minimum mass of *A* must be



(a) 2M (b)M

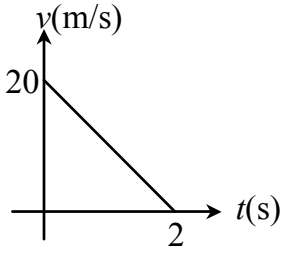
(c) $\frac{M}{2}$

(d) a function of *M* and the force constant of the spring

8. A river 400 m wide is flowing at a rate of 8 m/s. A man can swim at the rate of 10 m/s with respect to river. The time taken to reach the just opposite end is

(a) $\frac{200}{3}$ s (b) $\frac{400}{3}$ s (c) 50 s (d) none of these

9. Velocity-time graph of a particle of mass 2 kg moving in a straight line is as shown in figure. Work done by all the forces on the particle is



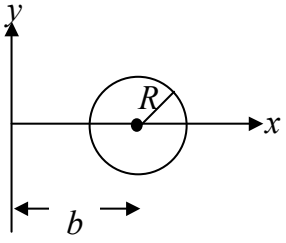
(a) 400 J (b) –400 J

(c) –200 J (d) 200 J

10. A projectile is given an initial velocity of $\hat{i} + 2\hat{j}$. The cartesian equation of its path is (g = 10 m/s^2) (Here $\hat{i}$ is unit vector along horizontal and $\hat{j}$ is unit vector vertically upwards)

(a) $y = 2x - 5x^2$ (b) $y = x - 5x^2$ (c) $4y = 2x - 5x^2$ (d) $y = 2x - 25x^2$

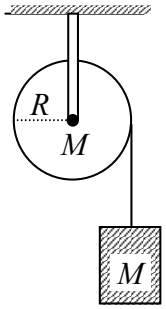
11. The figure represents a disc of mass *M* and radius *R*, lying in *x*-*y* plane with its center on *x*-axis at a distance '*b*' from the origin. The moment of inertia of the disc about *y*-axis is



(a) $M\left(\frac{R^2}{8} + b^2\right)$ (b) $M\left(\frac{R^2}{4} + b^2\right)$

(c) $M\left(\frac{R^2}{2}\right)$ (d) $M\left(\frac{R^2}{4}\right)$

12. A mass M is supported by a massless string wound round a uniform cylinder of mass M and radius R. On releasing the mass from rest, it will fall with acceleration



(a) g (b) $\frac{1}{2}$g

(c) $\frac{1}{3}$g (d) $\frac{2}{3}$g

SECTION – (B) CHEMISTRY

13. What weight of CO_2 will contain the same number of oxygen atoms as are present in 3.6 g water?

(a) 8.8 g (b) 7.2 g (c) 4.4 g (d) 220 g

14. From 392 mg of H_2SO_4, 1.204×10^{21} molecules are removed. How many moles of H_2SO_4 are left?

(a) 2.0×10^{-3} (b) 1.2×10^{-3} (c) 4.0×10^{-3} (d) 1.5×10^{-3}

15. Which of the following sets of quantum number is correct?

(a) $n=4, l=3, m=+4, s=+\frac{1}{2}$ (b) $n=3, l=2, m=+3, s=-\frac{1}{2}$

(c) $n=2, l=2, m=+2, s=+\frac{1}{2}$ (d) $n=1, l=0, m=0, s=-\frac{1}{2}$

16. In the electronic configuration given below which rule is violated?

N: 

(a) Aufbau rule (b) Pauli's exclusion principle

(c) Hund's rule (d) The configuration is correct

17. In which of the following sets do all the three compounds have bonds that are mainly ionic?

(a) NaCl, NCl_3, CCl_4 (b) CsBr, $BaBr_2$, SrO

(c) CsF, BF_3, NH_3 (d) Al_2O_3, CaO, SO_2

18. Which of the following diatomic molecules would be stabilized by the removal of an electron?

(a) C_2 (b) CN (c) N_2 (d) O_2

19. Identify the least stable ion amongst the following

(a) Na^- (b) Al^- (c) Mg^- (d) Si^-

20. Correct order of hybridization in NH_3, BCl_3, XeF_2, $XeOF_4$ is

(a) sp^3, sp^2, sp^3d^2, sp (b) sp^3, sp^2, sp, sp^3d^2

(c) sp^3, sp^3d, sp, sp^3d^2 (d) $sp^3, sp^2, sp^3d, sp^3d^2$

21. You are given four electronic configurations

(i) $2s^2$ (ii) $1s^22s^22p^63s^1$ (iii) $1s^22s^22p^5$ (iv) $1s^22s^22p^2$

Which one is capable of forming strongest ionic bond?

(a) (i) and (iii) (b) (ii) and (iii) (c) (iii) and (iv) (d) (ii) and (iv)

22. Which of these contains a $p\pi$–$d\pi$ bond?

(a) NH_4^+ (b) $[PCl_4]^+$ (c) PO_4^{3-} (d) All of these

23. In a process, a system does 140 J of work on the surroundings and only 40 J of heat is added to the system, hence change in internal energy is

(a) 180 J (b) –180 J (c) 100 J (d) –100 J

24. The change in entropy for the fusion of 1mol of ice is [melting point of ice = 273 K, mole enthalpy of fusion for ice $= 6.0 kJ\,mol^{-1}$]

(a) $11.73\ JK^{-1}mol^{-1}$ (b) $18.84\,JK^{-1}mol^{-1}$

(c) $21.97\,JK^{-1}mol^{-1}$ (d) $24.47\,JK^{-1}mol^{-1}$

SECTION – (C) BIOLOGY

25. Which of the following is a characteristic feature of Kingdom Protista that distinguishes it from other kingdoms?

(a) Prokaryotic cell structure (b) Presence of chitinous cell walls

(c) Ability to perform photosynthesis

(d) Eukaryotic, unicellular organisms

26. In a dicot leaf, the arrangement of vascular bundles is referred to as:

(a) Parallel venation

(b) Reticulate venation

(c) Radial arrangement

(d) Concentric arrangement

27. In a compound leaf, how are the leaflets arranged?

(a) Directly attached to the stem

(b) Arranged on a petiole

(c) Arranged on a rachis

(d) Arranged in a whorl

28. In which of the following plants would you find a spadix inflorescence?

(a) Sunflower (b) Maize

(c) Bougainvillea (d) Lily

29. Which of the following statements about Gymnosperms is incorrect?

(a) They produce seeds but no flowers.

(b) Their seeds are exposed and not enclosed within a fruit.

(c) They have vascular tissues, including xylem and phloem.

(d) They are mostly deciduous trees.

30. The presence of non-cellulosic polysaccharides in the cell wall is a characteristic of which group?

(a) Algae (b) Fungi

(c) Plantae (d) Animalia

31. The pericycle in roots is responsible for the formation of:
(a) Lateral roots (b) Root hairs
(c) Casparian strips (d) Endodermis

32. Which of the following features is a unique adaptation of xerophytic plants?
(a) Thin cuticle (b) Sunken stomata
(c) Large leaf surface area (d) High transpiration rate

33. Which of the following organic compounds is acid insoluble fraction but molecular weights do not exceed 800 Da?
(a) Protein (b) Nucleic acid
(c) Polysaccharide (d) Lipids

34. The length of DNA segment is 340 Å. How many base pairs are present in it?
(a) 100 (b) 34 (c) 10 (d) 340

35. Nucleolus, Golgi apparatus, ER reform in:
(a) Anaphase (b) Prophase (c) Telophase (d) Metaphase

36. G0 stage of cell denotes
(a) Exit of cell from cell cycle
(b) Check point before entering next phase (c) Death of cell
(d) Temporary pause/suspended cell cycle

37. What is a tonoplast?
(a) Outer membrane of mitochondria
(b) Inner membrane of chloroplast
(c) Membrane of the vacuole of plant cells
(d) Cell membrane of a plant cell

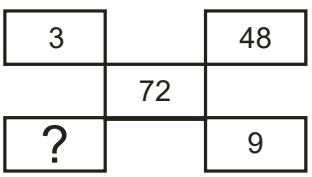
38. Lysosomes are produced by
(a) Golgi complex (b) Mitochondria
(c) Endoplasmic reticulum (d) Leucoplasts

39. In Osteichthyes, how many pairs of gills are present?
(a) 6-15 (b) 4-8 (c) 4 (d) 6

40. Which of the following is/are acoelomate?
(a) Echinodermata (b) Chordata
(c) Platyhelminthes (d) Both (a) and (b)

SECTION – (D) APTITUDE

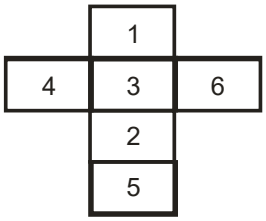
41. The number have been arranged according to an identical pattern. Find out the missing numbers:



(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)



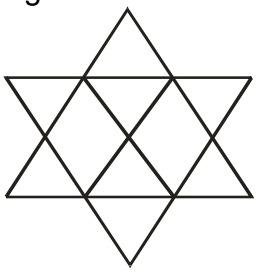
(A)

(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) 6^{th} , 13^{th} , 20^{th} & 27^{th} (b) 7^{th}, 14^{th} , 21^{th} & 28^{th}
(c) 2^{nd} , 9^{th} , 16^{th} , 23^{rd} & 30^{th} (d) 1^{st}, 8^{th}, 15^{th} & 22^{nd}

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) $22\frac{8}{11}$ minutes past 5 (d) $27\frac{3}{11}$ 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 = $-\frac{3}{2}$ (b) 6 M 18 Q 26 L 13 P 7 = $\frac{173}{13}$

(c) 11 M 34 L 17 Q 8 L 3 = $\frac{38}{3}$ (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 (MED)

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

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