Section : I - Aptitude and Logical Reasoning

1. Find the wrong number in the series.
1, 2, 6, 15, 31, 56, 91
(a) 31 (b) 15 (c) 56 (d) 91

2. In a certain code language,
(i) 'pit na som' means 'bring me water'
(ii) 'na jo tod' means 'water is life'
(iii) 'tub od pit' means 'give me toy'
(iv) 'jo lin kot' means 'life and death'

Which of the following represents 'is' in that language ?
(a) jo (b) na (c) tod (d) lin

3. Five people P, Q, R, S and T visit an office on certain days of a week. They work as a plumber, carpenter, cook, electrician and doctor in random order. A person pursues only one profession and visits the office only one day in the week. Consider the following information and answer questions based on it.
1. The plumber visits office every Monday.
2. P is an electrician who comes neither on Tuesday nor Thursday.
3. T is a carpenter and R is not plumber
4. The person who visits the office on Thursday is not a doctor.
5. S works on a Tuesday and T works on the following day.

Which is the right combination?
(a) Monday - Electrician (b) Thursday - Cook
(c) Tuesday - Carpenter (d) Friday - Doctor

4. How many pairs of letters are there in the word "CASTRAPHONE", which have as many letters between them in the word as in the alphabet?
(a) 3 (b) 4 (c) 5 (d) 6

5. Find the next number in the given number series?
6, 6, 12, 36, 144, 720, ?
(a) 4320 (b) 3547 (c) 2154 (d) 1765

ROUGH SPACE

Section : II - Mathematics

6. If abc =1, then find the value of $\left(\frac{1}{1+a+b^{-1}}+\frac{1}{1+b+c^{-1}}+\frac{1}{1+c+a^{-1}}\right)$

(a) 1 (b) 3 (c) 5 (d) None of these

7. Find the value of $4^{2^{2^{15^{6}}}}$

(a) $(256)^{30}$ (b) $(4)^{120}$ (c) 4^{8} (d) 2^{8}

8. Find the value of $\left(2^{\frac{1}{4}}-1\right)\left(2^{\frac{3}{4}}+2^{\frac{1}{2}}+2^{\frac{1}{4}}+1\right)$

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

9. Which of the following is the rationalized form of $\frac{a^2}{\sqrt{a^2+b^2}+b}$?

(a) $\frac{a^2\left(\sqrt{a^2+b^2}-b\right)}{b^2}$ (b) $\sqrt{a^2+b^2}-b$ (c) $\sqrt{a^2+b^2}+b$ (d) $\frac{1}{\sqrt{a^2+b^2}-b}$

10. Find the exact value of the following summation:

$$E=\frac{1}{\sqrt{4}+\sqrt{5}}+\frac{1}{\sqrt{5}+\sqrt{6}}+\frac{1}{\sqrt{6}+\sqrt{7}}+\ldots+\frac{1}{\sqrt{24}+\sqrt{25}}$$

(a) 7 (b) $5-\sqrt{24}$ (c) 3 (d) 3.2

11. Simplify the following expression,

$$\sqrt{x^2+2y\sqrt{x^2-y^2}}+\sqrt{x^2-2y\sqrt{x^2-y^2}}$$

(a) x^2+2y^2 (b) $2\sqrt{x^2+y^2}$ (c) $2\sqrt{x^2-y^2}$ (d) 2x

ROUGH SPACE

12. If $\frac{9^{n+1}\left(3^{-n/2}\right)^{-2}-27^{n}}{\left(3^{m}\times 2\right)^{3}}=\frac{1}{729}$,

Then which of the following relations between m and n is true?

(a) m = n – 1 (b) m = n + 2 (c) m = 2n (d) m = 3 – n

13. If $x=3-\sqrt{8}$, find the value of $x^{3}+\frac{1}{x^{3}}$.

(a) 108 (b) 180 (c) 198 (d) 216

14. Evaluate:

$4\times(81)^{-1/2}\times\left[81^{1/2}+81^{3/2}\right]$

Which of the following is the correct value?

(a) 328 (b) 324 (c) 164 (d) 80

15. Which of the following is the correct ascending order of $\sqrt{5}, \sqrt[3]{11}, \sqrt[6]{3}$?

(a) $\sqrt{5}, \sqrt[3]{11}, \sqrt[6]{3}$ (b) $\sqrt[3]{11}, \sqrt{5}, \sqrt[6]{3}$ (c) $\sqrt[6]{3}, \sqrt[3]{11}, \sqrt{5}$ (d) $\sqrt[6]{3}, \sqrt{5}, \sqrt[3]{11}$

Section : III - Science

16. Arrange the following prefixes in order from largest to smallest (descending order): tera, peta, giga, mega.

(a) giga, tera, peta, mega (b) peta, tera, giga, mega

(c) tera, peta, mega, giga (d) peta, giga, tera, mega

17. Which of the following physical quantities has the same dimensions as work?

(a) Torque (b) Momentum (c) Power (d) Pressure

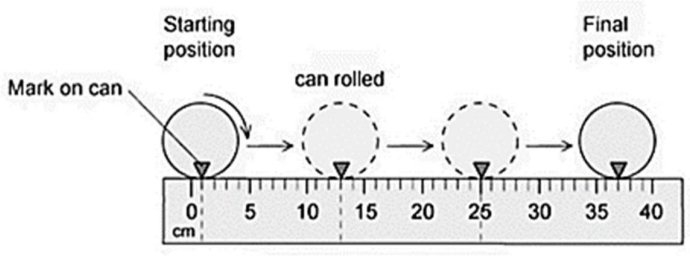
18. If the units of mass, length, and time are doubled, how will the unit of density change?

(a) It will become 2 times the original unit. (b) It will become 8 times the original unit.

(c) It will become $\frac{1}{4}$ times the original unit. (d) It will become $\frac{1}{2}$ times the original unit.

ROUGH SPACE

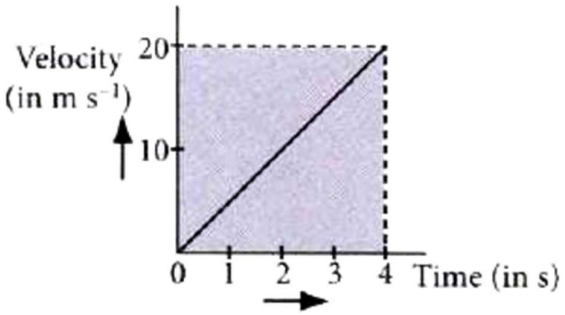
19. A student uses a ruler to determine the circumference of a wooden dowel. She puts a mark onto the dowel, then rolls it along the ruler three times, before reading the position on the ruler at which it stopped.
What is the circumference of the dowel?



(a) 36 cm (b) 12 cm (c) 37 cm (d) 12.3 cm

20. Calculate the momentum of a toy car weighing 500 g and moving with a velocity of 20 m/s.
(a) 10 kg m/s (b) 20 kg m/s (c) 30 kg m/s (d) 40 kg m/s

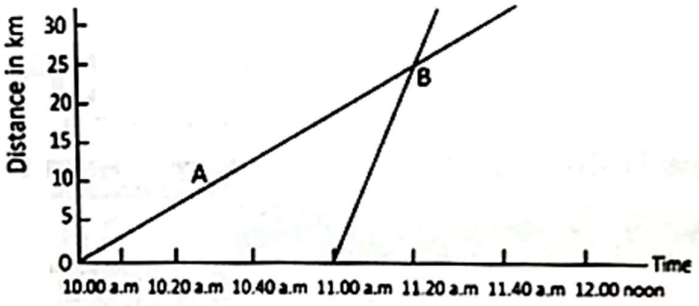
21. The velocity-time graph of a ball moving on the surface of a floor is given below:



Calculate the force acting on the ball, if mass of the ball is 200 g.
(a) 0.5 N (b) 1 N (c) 1.5 N (d) 2 N

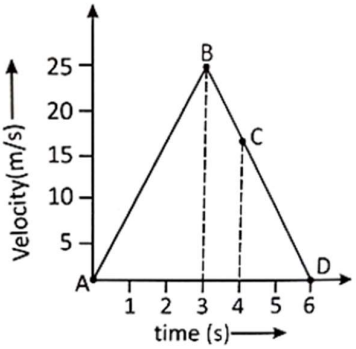
ROUGH SPACE

22. Two friends A and B started from the same location and went 30 km along a road in the same direction. When and where did B overtake A? The given figure shows their motions through graphs.



(a) At 11.20 am, at a point 30 km away from the starting point.
(b) At 10.20 am, at a point 20 km away from the starting point.
(c) At 11.20 am, at a point 25 km away from the starting point.
(d) At 10.30 am, at a point 25 km away from the starting point

23. From the velocity-time graph given below, calculate the acceleration from A and B.



(a) 3.15 m/s^2 (b) 8.33 m/s^2 (c) 5.17 m/s^2 (d) 6.18 m/s^2

24. A bicyclist encounters a series of hills. Uphill speed is always v_1 and downhill speed is always v_2. The total distance travelled is ℓ, with uphill and downhill portions of equal length. The cyclist's average speed is

(a) $\frac{v_1}{v_2}$ (b) $\frac{v_2}{v_1}$ (c) $\frac{v_1 v_2}{v_1 + v_2}$ (d) $\frac{2v_1 v_2}{v_1 + v_2}$

ROUGH SPACE

25. A car travels first $\frac{1}{3}$ of the distance AB at 30 km/hr next $\frac{1}{3}$ of the distance at 40 km/hr, last $\frac{1}{3}$ of the distance at 24 km/hr. Its average speed in km/hr for the whole journey is
(a) 40 (b) 35 (c) 30 (d) 28

26. In a cation carrying two +ve charges there are 20 protons and 21 neutrons. Therefore, the number of electrons will be
(a) 19 (b) 18 (c) 20 (d) 22

27. What is oxidation state of Fe in ferrous ion?
(a) +2 (b) 0 (c) +3 (d) +1

28. In a negatively charged ion X, there are 17 protons & 19 electrons. Then the charge on ion will be
(a) X^{2-} (b) X^{-} (c) X^{2+} (d) X^{+}

29. If masses of chlorine atoms and chloride ions are equal then which of the following statement is false?
(a) They contain equal number of protons (b) They contain equal number of neutrons
(c) They possess same mass number (d) They contain equal number of electrons

30. The formula of the sulphate of an element x is $X_2(SO_4)_3$. The formula of nitride of element X will be
(a) X_2N (b) XN_2 (c) XN (d) X_2N_3

31. The number of electrons in an element with atomic number X and atomic mass Y will be
(a) X – Y (b) Y – X (c) X + Y (d) X

32. Which of the following has more electrons than neutrons?
(a) Na^{+} (b) F^{-} (c) O^{2-} (d) Mg^{2+}

33. The particles which cannot be deflected under the presence of electric field:
(a) electrons (b) proton (c) neutron (d) α-particle

34. The existence of the nucleus was discovered by:
(a) J.J. Thomson (b) Rutherford (c) Bohr (d) Goldstein

ROUGH SPACE

35. The atom and its ion differ in the number of:
(a) electrons (b) protons (c) neutrons (d) nucleons

36. _____ expands the surface area for mitochondrial function.
(a) Inner membrane (b) Intermembrane space
(c) Matrix (d) Cristae

37. The nucleolus is the site of formation of
(a) ribosomes (b) spindle fibres (c) chromosomes (d) peroxisomes

38. Golgi bodies are involved in
(a) Recycling of broken plasma membrane during endocytosis
(b) Modification of proteins
(c) Synthesis of glycolipids
(d) All of the above

39.

	List-I		List-II
(A)	Squamous Epithelium	(I)	Goblet cells of alimentary canal
(B)	Ciliated Epithelium	(II)	Inner lining of pancreatic ducts
(C)	Glandular Epithelium	(III)	Walls of blood vessels
(D)	Compound Epithelium	(IV)	Inner surface of Fallopian tubes

Choose the correct answer from the options given below:
(a) A-II, B-III, C-I, D-IV (b) A-II, B-IV, C-III, D-IV
(c) A-III, B-I, C-II, D-IV (d) A-III, B-IV, C-I, D-II

40. Intercalary meristems are found
(a) at internodes and base of leaves (b) at growing tips of roots
(c) beneath the bark (d) at the tips of the stem

41. Which of the followings lack vacuoles in their cytoplasm?
(a) Meristematic tissues (b) Permanent tissues (c) Epidermal tissues (d) Chlorenchyma

42. Which muscular tissue shows branching and intercalated discs?
(a) Skeletal (b) Cardiac (c) Smooth (d) Voluntary

ROUGH SPACE

43. Type of epithelial tissue that produce and secrete substance like mucus, saliva, etc. is _____ epithelium.
(a) Brush border (b) Glandular (c) Ciliated (d) Sensory

44. The cartilage is composed of cells called _____.
(a) Lacunae (b) Chondrocyte (c) Osteocyte (d) Fibroblast

45. Tip of the nose have
(a) Areolar tissue (b) Elastic cartilage (c) Hyaline cartilage (d) Fibro cartilage

ROUGH SPACE