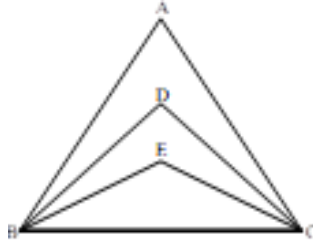## Section – I
MATHEMATICS

1. If $\dfrac{\sqrt[3]{2} \cdot \sqrt{3}}{\sqrt[6]{6}} = \sqrt[12]{k}$ Then k the value of k is

   (a) 144 (b) 196
   (c) 324 (d) 576

2. The value of $\dfrac{1}{1+\sqrt{2}} + \dfrac{2}{\sqrt{2}+2} + \dfrac{3}{2+\sqrt{7}} + \dfrac{4}{\sqrt{7}+\sqrt{11}} + \dfrac{5}{\sqrt{11}+4}$ is

   (a) 3 (b) 5
   (c) 21 (d) 19

3. If $(x+a)(x-3) = x^2 + 4x + b$ then the value of $a^2 - b$ is

   (a) 60 (b) 70
   (c) 80 (d) 28

4. If $(2+1)(2^2+1)(2^4+1)(2^8+1)(2^{16}+1) = 2^k - 1$ then the value of k is

   (a) 16 (b) 17
   (c) 64 (d) 32

5. If $(a^2 + b^2)^3 = (a^3 + b^3)^2$ then the value of $\dfrac{a}{b} + \dfrac{b}{a}$ is

   (a) $\dfrac{3}{2}$ (b) $\dfrac{4}{3}$

   (c) $\dfrac{2}{3}$ (d) $\dfrac{3}{4}$

6. If $2^a = 3, 3^b = 5, 5^c = 8$ then the value of $a \cdot b \cdot c$ is

   (a) 3 (b) 4
   (c) 5 (d) 8

7. The number of digits in the expansion of the number $4^{30} \cdot 25^{25}$ is

   (a) 54 (b) 55
   (c) 80 (d) 62

8. If $a^p \cdot a^q \cdot a^r = a^{p+q+r}$ then $\dfrac{p+q}{pq-1} + \dfrac{q+r}{qr-1} + \dfrac{p+r}{pr-1}$ is

   (a) $p + q - r$ (b) $p - q + r$

   (c) pqr (d) 1

9. If $x + \dfrac{1}{2x} = 4$ then the value of $x^3 + \dfrac{1}{8x^3}$ is

   (a) 16 (b) 17
   (c) 64 (d) 58

10. In the figure below, ABC is a scalene triangle. BE, BD trisect $\angle ABC$, and CE, CD trisect $\angle BCA$ and $\angle BAC = 30^0$ Then $\angle BDC = $ ___

    (a) 60°
    (b) 80°
    (c) 100°
    (d) 75°

Section – II
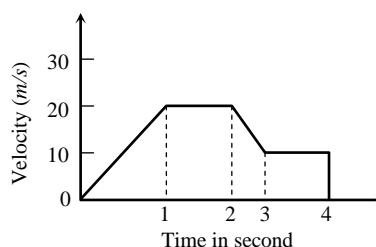## PHYSICS

11. The acceleration due to the gravity at the centre of the earth is ____.
    (a) Infinite   (b) Zero
    (c) 9.8 ms^{-2} (d) None of these

12. The values of 'g' is _____.
    (a) constant everywhere on the earth
    (b) greater at the poles of the earth as compared to equator
    (c) constant everywhere in the universe
    (d) greater at the equators of the earth compared to poles

13. Two balls, one of iron and other of aluminium experience same upthrust when dipped in water –
    (a) both have equal volume
    (b) both have equal weight in air
    (c) both have equal density
    (d) nothing definite can be said

14. The height at which a body has one fourth of its weight, when it is on the surface of earth (radius of earth = R) is

    (a) at height R   (b) at height $\frac{R}{2}$

    (c) at height $\frac{R}{4}$ (d) at height 2R

15. An object is projected upwards with a velocity of 100 m/s. It will strike the ground after (approximately)
    (a) 10 sec   (b) 20 sec   (c) 15 sec   (d) 5 sec

16. Work is the product of time and _____.
    (a) power   (b) energy   (c) force   (d) acceleration

17. A body of mass 20 kg, slows down from 5ms^{-1} to 2ms^{-1} by a retarding force. The work done by the force is –
    (a) 50 J   (b) 200 J   (c) 300 J   (d) 210 J

18. Rahul while driving to school, computes the average speed of his trip to be 20 kmh^{-1}. On his return trip along the same route, there is less traffic and average speed is 40 kmh^{-1}. The average speed of Rahul's round trip is:

    (a) 26.7 kmh^{-1} (b) 24.7 kmh^{-1} (c) 28.7 kmh^{-1} (d) 30 kmh^{-1}

19. The variation of velocity of a particle with time moving along a straight line is illustrated in the following figure. The distance travelled by the particle in four seconds is ___

    (a) 60 m

    (b) 55 m

    (c) 25 m

    (d) 30 m

20. Impulse has same unit as that of –

    (a) force   (b) pressure

    (c) momentum   (d) moment of force

Section – III
CHEMISTRY

21. On increasing the temp of copper from 20°C to 80°C, which of the following happens?

    (a) Position of copper atoms change, so potential energy increases

    (b) Vibration of copper atoms increases so kinetic energy decreases

    (c) Position of copper atoms change, so kinetic energy increases

    (d) Vibration of copper atoms increases, so kinetic energy increases

22. 50ml of the below mentioned liquids, is poured on the floor. Which will occupy the maximum surface area in the floor?

    (a) Paint   (b) Nail polish

    (c) Water at 20°C   (d) Water at 80°C

23. If there is another planet which has an atmospheric pressure half of that of the earth, then if we try to boil water on this planet, it will boil at

    (a) 100°C   (b) less than 100°C

    (c) more than 100°C   (d) cannot be predicted

24. When a glass of water is placed in the freezer, the water start freezing to ice

    (a) from top to bottom   (b) from bottom to top

    (c) from outside towards inside   (d) all at the same time, in no particular direction

25. 10 grams of H_2O is taken in the form of water, ice and steam. The one which has least density is

    (a) Ice   (b) Water

    (c) Steam   (d) All have same density

26. A solution is made by mixing 20g of sugar in 180grams of water. The concentration of this solution in mass by mass percentage will be

(a) 10   (b) 100/9   (c) 1   (d) 9/100

27. 500gms of a solution was made by mixing two salts A and B in water. The mass % of A found to be 10% and b was found to be 20% in the solution. The mass of A and B in the solution in respectively

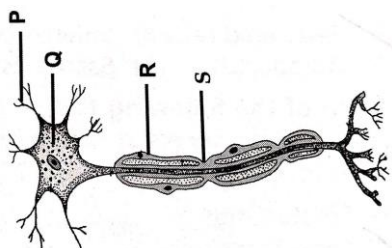(a) 50g, 100g   (b) 10g, 20g   (c) 45g, 90g   (d) 49g, 96g

28.

Gas	Boiling point
A	– 186
B	– 183
C	– 196
D	– 172

A mixture of gases A, B, C and D are compressed and then cooled to convert into a liquid. This liquid mixture is now warmed in a fractional distillation column. The gas obtained at the highest point in the column will be

(a) A   (b) B

(c) C   (d) D

29. A mixture of salt, sand and sulphur is shaken with water and filtered through filter paper. The filtrate is evaporated to dryness in a China dish. What will be left in the dish after the evaporation?

(a) Salt and sulphur   (b) Salt only

(c) Sulphur only   (d) All the three

30. 1 mole of oxygen atoms can represent

(a) 6.02×10^{23} molecules of O_2 (b) 22.4 L of O_2 at STP

(c) 11.2 L of O_2 at STP   (d) 12.04×10^{23} molecules of O_2

Section – IV
BIOLOGY

31. Which of the following are complex tissues?

(a) Parenchyma and collenchyma   (b) Collenchyma and sclerenchyma

(c) Xylem and phloem   (d) Xylem and Parenchyma

32. Which of the following connects bones and muscles?

(a) Tendons   (b) Ligament   (c) Collagen   (d) Cartilage

33. Which of the following labelled parts in the figure given below receives nerve impulses from other neurons?
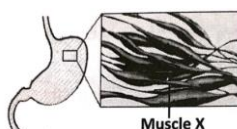

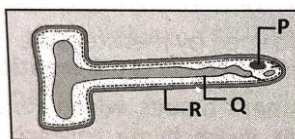(a) P   (b) Q   (c) R   (d) S

34. What are the functions of the stomata?

    (i) Take in water   (ii) Trap sunlight

    (iii) Take in oxygen   (iv) Give out CO_2

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

35. Which of these characteristics are true about 'X'?

    (a) Cylindrical, syncytial, unbranched and voluntary

    (b) Cylindrical, striped, nucleated and voluntary

    (c) Cylindrical, striped, branched and involuntary

    (d) Spindle, unbranched, uni-nucleated and involuntary

36. Which of the following epithelial tissues lines the inner surface of the trachea?

    (a) Squamous   (b) Cuboidal

    (c) Hyaline cartilage   (d) Ciliated

37. Which of the following substances is present in the cell walls of sclerenchyma?

    (a) Cellulose   (b) Pectin

    (c) Lignin   (d) Hemicellulose

38. Identify the parts labelled P, Q and R in the diagram of a root hair cell, shown below.

    (a) P-Vacuole, Q-Nucleus, R-Cell wall.

    (b) P-Protoplasm, Q-Nucleus, R-cell wall membrane

    (c) P-Nucleus, Q-Vacuole, R-cell wall

    (d) P-Mitochondria, Q-Nucleus, R-cell wall

39. Which part of the cell stores nutrients?

    (a) Mitochondria   (b) Vacuole   (c) Ribosome   (d) Oxysome

40. Ravi conducted an experiment to investigate what would happen when different cell organelles of a balsam plant leaf are removed. The results are recorded in the table given below.

Cell Parts	Out comes
P	The cell cannot function properly
Q	Iodine solution remains yellowish brown
R	The cell cannot control the entry and exit of the substances
S	The cell loses its regular shape

    Identify cell parts P, Q, R and S.

(a) Nucleus – Chlorophyll – Cell Wal – Cytoplasm

(b) Cytoplasm – Chloroplast – Nucleus – Cell membrane

(c) Nucleus – Chloroplast – Cell membrane – Cell wall

(d) Nucleus – Chloroplast – Cell wall – Cell membrane

Section – V

Aptitude

41. Find the missing number/letter.

    1, 1, 4, 8, 9, 27, 16, ?

    (a) 32   (b) 25   (c) 64   (d) 80

42. Find the missing number/letter.

    7, 7, 14, 42, 168, ?

    (a) 688   (b) 886   (c) 840   (d) 680

43. Find the missing number/letter.

    R K, U N, X Q, A T, ?

    (a) D V   (b) E W   (c) E V   (d) D W

44. Find the missing number/letter.

    I S K, L T N, P V Q, U Y T, ?

    (a) Z C V   (b) Z C W   (c) A C W   (d) B C W

45. Find the missing number/letter.

    – c h c L s c h c – s – h – L s c – c L

    (a) s L c c h   (b) s L L c h   (c) s c L c h   (d) L c h c l

46. Find the odd-numeral pair.

    (a) 2345   (b) 3456   (c) 5467   (d) 5678

47. Find the odd-numeral pair.

    (a) 2468   (b) 2648   (c) 4826   (d) 6482

48. Find the odd-numeral pair.

    (a) 256   (b) 625   (c) 1225   (d) 2401

49. Find the odd-numeral pair.

    (a) 1112   (b) 4445   (c) 7778   (d) 6665

50. If in a certain language, ITNIETAM is the code for INTIMATE, which word has the code

    TREVNIETARBI?

    (a) INVRETIBRATE   (b) INVERTIBARTE   (c) INVERTIBRETA   (d) INVERTIBRATE

ANSWER KEY

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