IIT ASHRAM BRINGS...

Spread Your Wings

उड़ान

A QUEST FOR SCIENCE ASPIRANTS !

CLASS 9

Science Aptitude Test

SCIENCE APTITUDE TEST

TIME : 3 HOURS | **MAX MARK : 400** | **DATE : 28- 01- 2024**

INSTRUCTIONS

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

Caution : Class, as given on paper above MUST be correctly marked on the answer OMR sheet before attempting the paper. Wrong Class will give wrong results.

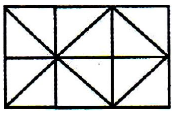
1. This booklet consists of 100 questions. Question paper consists of 4 sections. Marking scheme is given in table below:

Section	Subject	Questions No.	Making Scheme for each questions	
			Correct Answer	Wrong Answer
PART - **I**	Mental Ability	15	4	-1
PART - **II**	Mathematics	40	4	-1
PART - **III**	Physics & Chemistry	30	4	-1
PART - **IV**	Biology	15	4	-1

3. Answers have to be marked on the OMR sheet. The Question Paper contains blank spaces for your rough work. No additional sheets will be provided for rough work.
4. Blank papers, cellular phones, smart watches, log tables, slide rule, calculator and electronic devices, in any form, are not allowed.

PART - I : MENTAL ABILITY

1. How many squares does the figure have ?



(a) 6 (b) 7
(c) 9 (d) 10

2. If paper is called eraser, eraser is called bag, bag is called scale, scale is called pencil and pencil is called paper, what will a person write with?

(a) Pencil (b) Paper
(c) Eraser (d) Bag

3. A man is facing North-West. He turns 90º in the clockwise direction, then 180º in the anticlockwise direction and then another 90º in the same direction. Which direction is he facing now ?

(a) South (b) South-West
(c) West (d) South-East

4. If + means ÷, – means ×, ÷ means + and × means –, then 36 × 12 + 4 ÷ 6 + 2 – 3 = ?

(a) 2 (b) 18
(c) 42 (d) 6 ½

5. If the word CLERK is coded as EOIWQ, how could you code the word TABLE?

(a) VCDNG (b) VCDGI
(c) VDFQK (d) VDFOK

6. Vijay is taller than Mohan but shorter than Ashok. Shashi is taller than Mohan but shorter than vijay. Among them who is the tallest?

(a) Ashok
(b) Vijay
(c) Either Ashok or Shash
(d) None of the above

7. If 1st April, 2003 was Monday, then which day of the week will 25th December of the same year be?

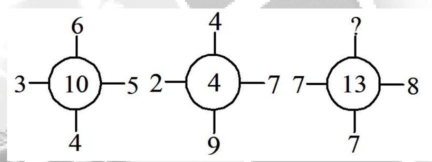
(a) Tuesday (b) Wednesday
(c) Thursday (d) Friday

8. Pointing to a person, Raju said, "He is the only brother of my father's mother's daughter." How is the person related to Raju?

(a) Brother (b) Father
(c) Uncle (d) Nephew

9. What is the number of odd days in a leap year?

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

10. 

(a) 9 (b) 8
(c) 7 (d) 5

11. How many times do the hands of a clock coincide in a day ?

(a) 24 (b) 22
(c) 21 (d) 20

12. Find the water image of the following combination of digits: 427911

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

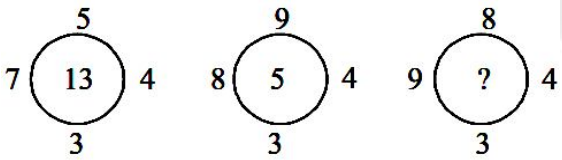
Space for Rough Work

13. Study the pattern of the numbers in the following questions and select the missing numbers in the place of question mark (?). Mark the correct alternative on your answer-sheet as directed.

21	56	70
45	87	84
115	180	?

(a) 130 (b) 195
(c) 295 (d) 150

14. Study the pattern of the numbers in the following questions and select the missing numbers in the place of question mark (?). Mark the correct alternative on your answer-sheet as directed.



(a) 4 (b) 8
(c) 12 (d) 15

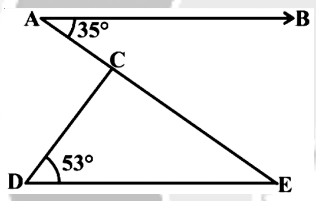
15. An accurate clock shows 8 o'clock in the morning. Through how may degrees will the hour hand rotate when the clock shows 2 o'clock in the afternoon?

(a) 144° (b) 150°
(c) 168° (d) 180°

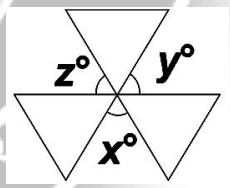
Space for Rough Work

PART - II : MATHEMATICS

1. Degree of the zero polynomial is
   (a) 0
   (b) 1
   (c) Any natural number
   (d) Not defined
2. The point (–5, 2) are (2, – 5) lie in the :
   (a) same quadrants
   (b) II and III quadrant respectively
   (c) II and IV quadrants respectively
   (d) IV and III quadrants respectively
3. If (2, 0) is a solution of the linear equation $2x + 3y = k$, then the value of k is
   (a) 4 (b) 6
   (c) 5 (d) 2
4. In the given figure, if $AB||DE, \angle BAC = 35^o$, and $\angle CDE = 53^o$, then $\angle DCE$?



   (a) 145^0 (b) 127^0
   (c) 88^0 (d) 92^0
5. If $x^{\frac{1}{3}} + y^{\frac{1}{3}} + z^{\frac{1}{3}} = 0$, then
   (a) $x + y + z = 0$
   (b) $(x + y + z)^3 = 27xyz$
   (c) $x + y + z = 3xyz$
   (d) $x^3 + y^3 + z^3 = 0$
6. If $A = x - \frac{1}{x}$, then the value of $\left(A + \frac{1}{A}\right)$ is
   (a) $\frac{x^4 + x^2 + 1}{x(x^2 - 1)}$ (b) $\frac{x^4 + 1}{x^3 - x^2}$
   (c) $\frac{x^4 - x^2 + 1}{x(x^2 - 1)}$ (d) 1
7. Which of the following is not equal to 0.000000875?
   (a) 8.75×10^{-7} (b) 875×10^{-9}
   (c) $\frac{7}{8} \times 10^{-7}$ (d) $\frac{7}{8} \times 10^{-6}$
8. $\sqrt{11\sqrt{11\sqrt{11\sqrt{11}}}}$ is equal to
   (a) $\sqrt[16]{11^5}$ (b) $\sqrt[16]{11}$
   (c) $\sqrt[16]{11^{14}}$ (d) $\sqrt[16]{11^{15}}$
9. $2^x = 8^{y+1}$ and $9^y = 3^{x-9}$ then x+y=_____.
   (a) 27 (b) 21
   (c) 18 (d) 24
10. in the given figure, three equilateral triangles have a common vertex then x + y + z = _____.

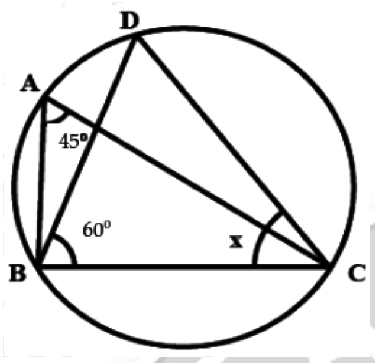


   (a) 90^o (b) 120^o
   (c) 150^o (d) 180^o

Space for Rough Work

11. What is the percentage increase in the area of a triangle if its each side is doubled?
(a) 100% (b) 200%
(c) 300% (d) 400%

12. In the following figure. Find the value of x.



(a) 30^0 (b) 45^0
(c) 60^0 (d) 75^0

13. For x > 0, the median of x + 2, x - 3, x + 4, x - 5, x + 3, x+ 4, x - 6 is 10. What is the value of x ?
(a) 15 (b) 7
(c) 8 (d) 16

14. The value of
$\frac{1}{1+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+....\text{to } 99$ terms is
(a) 9 (b) 10
(c) $1+\sqrt{99}$ (d) $\sqrt{99}-1$

15. If P and Q are integers $\sqrt{PQ}=12$, then what cannot be the value of P +Q ?
(a) 42 (b) 24
(c) 30 (d) 26

16. If $\sqrt[4]{\sqrt[3]{x^2}}=x^k$, then the value of 'k' is
(a) $\frac{1}{4}$ (b) $\frac{1}{6}$
(c) $\frac{1}{9}$ (d) $\frac{1}{3}$

17. The perimeter of right angle triangle is 90m and its area is 270 sqm m. Find the length of hypotenuse
(a) 39m (b) 37
(c) 38 (d) None of these

18. In the given figure, BO and CO are the bisectors of $\angle B$ and $\angle C$ respectively. If $\angle A = 50^o$ then $\angle BOC = ?$
(a) 130^o (b) 100^o
(c) 115^o (d) 120^o

19. Two dice are thrown simultaneously. The probability of getting a doublet is
(a) 0 (b) $\frac{1}{3}$
(c) $\frac{1}{6}$ (d) $\frac{5}{6}$

20. An equilateral triangle is inscribed in a circle of radius 6 cms. Find its sides.
(a) $4\sqrt{3}$ cms (b) $6\sqrt{3}$ cms
(c) $8\sqrt{3}$ cms (d) 10cms

21. If (x + a) be a common factor of $x^2 + px + q$ and $x^2 + lx + m$, then the value of a is
(a) $\frac{m+q}{l-p}$ (b) $\frac{m-q}{l+p}$
(c) $\frac{m+q}{l+p}$ (d) $\frac{m-q}{l-p}$

22. If $27^{x+1} = 9^{x+3} = 3^y$ then x and y are:
(a) 3, 12 (b) 12, 3
(c) 6,6 (d) None of these

23. If a cylindrical barrel measures 22 cm in diameter, how many cm will it roll in 8 revolutions along a smooth surface if length 1 cm ?
(a) 121π cm (b) $168\ \pi$ cm
(c) $176\ \pi$ cm (d) $228\ \pi$ cm

Space for Rough Work

24. $(a + b) : (b + c) : (c + a) = 6 : 7 : 8$ and $a + b + c = 14$ then value of c is_____

(a) 8 (b) 7

(c) 6 (d) 12

25. The sides of a triangle are 11cm,15cm, 16cm resp. The altitude to largest side is_____

(a) $30\sqrt{7}$ cm (b) $\frac{15\sqrt{7}}{2}$ cm

(c) $\frac{15\sqrt{7}}{4}$ cm (d) 30 cm

26. By selling a book for Rs. 585, 30% profit is earned. The cost price of the book is

(a) 400 (b) 450

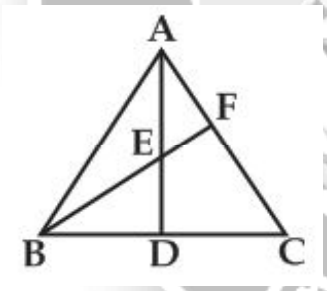
(c) 440 (d) 145

27. If $x + y = 17$ and $x^2 + y^2 = 167$, then what is the value of xy?

(a) $17+4\sqrt{114}$ (b) 61

(c) $48+\sqrt{167}$ (d) 122

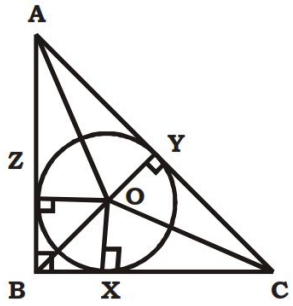
28. In the given figure, AD is a median of ΔABC and E is the midpoint of AD. If BE is joined and produced to meet AC in F then AF = ?



(a) $\frac{1}{2}AC$ (b) $\frac{1}{3}AC$

(c) $\frac{2}{3}AC$ (d) $\frac{3}{4}AC$

29. If in ΔABC, $\angle B = 90^0$, AB = 6 cm, BC = 8 cm $OX \perp BC$, $OY \perp AC$, $OZ \perp AB$, OX = OY = OZ, then the inradius is



(a) 3 cm (b) 4 cm

(c) 2 cm (d) 1 cm

30. A cyclic polygon of n sides such that each of its interior angle measures 144^0. What is the measure of the angle substended by each of its side at the geometrical centre of the polygon?

(a) 144^0 (b) 30^0

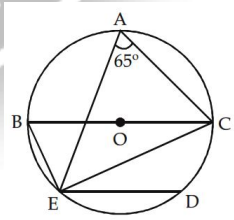
(c) 36^0 (d) 54^0

31. Two Toys are sold at Rs.504 each. One toy brings the dealer a gain of 12% and the other at a loss of 4%. The gain or loss percent by selling both the toys is-

(a) $3\frac{5}{13}\%$ profit (b) $4\frac{5}{13}\%$ profit

(c) $5\frac{1}{13}\%$ profit (d) $2\frac{3}{13}\%$ loss

32. In the given figure, chord ED is parallel to the diameter BC of the circle. Given, $\angle CAE = 65^o$, find $\angle DEC$.



(a) 55 (b) 35

(c) 25 (d) 40

Space for Rough Work

33. A mixture contains alcohol and water in the ratio 4 : 3. If 5 litres of water is added to the mixture, the ratio becomes 4 : 5. The quantity of alcohol in the given mixture is

(a) 10 litres (b) 15 litres

(c) 5 litres (d) 2.5 litres

34. If $4^x+4^x+4^x+4^x+4^x+4^x+4^x+4^x=\frac{1}{512}$, then what is the value of $\frac{-3}{x}$?

(a) 0.50 (b) 0.75

(c) 0.75 (d) 4.25

35. Two coins are tossed simultaneously. The probability of getting at least one head is_____

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$

(c) $\frac{3}{4}$ (d) 0

36. $\sqrt{2}, \sqrt[3]{3}, \sqrt{5}$ in their descending order are?

(a) $\sqrt[3]{3}, \sqrt{5}, \sqrt{2}$ (b) $\sqrt{2}, \sqrt[3]{3}, \sqrt{5}$

(c) $\sqrt{2}, \sqrt{5}, \sqrt[3]{3}$ (d) $\sqrt{5}, \sqrt[3]{3}, \sqrt{2}$

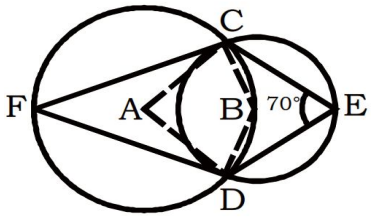
37. The value of

$$\sqrt{10+\sqrt{25+\sqrt{108+\sqrt{154+\sqrt{225}}}}}$$

(a) 4 (b) 6

(c) 8 (d) 10

38. Two circles with centres at A and B intersect at C and D. The centre B lies on the circumference of the circle with centre A. If CED = 70°, then CFD is



(a) 140º (b) 30º

(c) 80º (d) 40º

39. If one angle of a triangle is equal to sum of the other two angles, then the triangle is

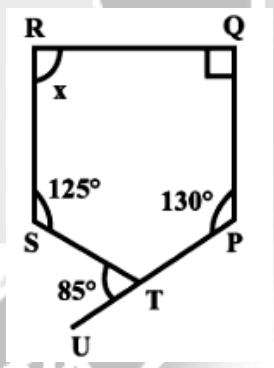
(a) an isosceles triangle

(b) an obtuse triangle

(c) an equilateral triangle

(d) a right triangle

40. In the figure given below, PTU is a straight line.



What is the value of x?

(a) 100^0 (b) 110^0

(c) 120^0 (d) 130^0

Space for Rough Work

PART - III : PHYSICS & CHEMISTRY

1. When we hold a book in our hand, we are balancing the gravitational force on the book due to

(a) Normal force provided by our hand
(b) Friction force provided by our book
(c) Both (a) and (b)
(d) None of these

2. The distance travelled by a body is directly proportional to the time taken. Its speed
(a) increases (b) decreases
(c) becomes zero (d) remains constant

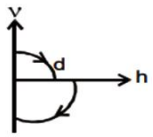
3. A ball thrown vertically upwards after reaching a maximum height h, returns to the starting point after a time of 10 s. Its displacement is
(a) h (b) 2 h
(c) 10 h (d) zero

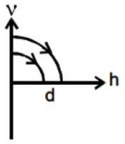
4. Match the Column I and Column II.

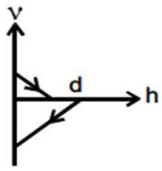
Column I	Column II
(A) Velocity	(1) m/s^2
(B) Displacement	(2) Vector
(C) Speed	(3) m/s
(D) Acce;eration	(4) scalar

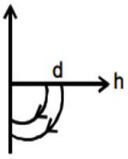
(a) A- 2,3; B-2; C-3,4 ; D-1
(b) A-2, B-1; C-3, D-4
(c) A-1, 2, 3; B-3; C-4; D-1, 3
(d) A-2, B-4; C-1; D-3

5. A ball is dropped vertically from a height d above the ground. It hits the ground and bounces up vertically to a height d/ 2. Neglecting subsequent motion and air resistance, its velocity v varies with the height h above the ground as

(a) 

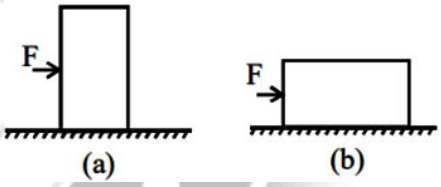
(b) 

(c) 

(d) 

6. Newton's second law measures the
(a) acceleration (b) force
(c) momentum
(d) angular momentum

7. A rectangular block is placed on a rough horizontal surface in two different ways as shown, then



(a) friction will be more in case (a)
(b) friction will be more in case (b)
(c) friction will be equal in both the cases
(d) friction depends on the relations among its dimensions

Space for Rough Work

8. Swimming is possible on account of
   (a) first law of motion
   (b) second law of motion
   (c) third law of motion
   (d) newton's law of gravitation
9. The net force on a rain drop falling down with a constant speed is _____
   (a) Weight of drop W
   (b) Resistance of air F
   (c) Weight W + Resistance of air F + force of buoyany
   (d) zero
10. A light and a heavy body have equal momentum. Which one has greater K.E.?
   (a) The lighter body
   (b) The heavier body
   (c) Both have equal K.E.
   (d) Data given is incomplete
11. Which of the following statement(s) is/are correct?
   I. K.E. of a system can be changed without changing its momentum
   II. Momentum of a system can be changed without changing its K.E.
   (a) I only (b) II only
   (c) I and II (d) None of these
12. The value of G varies with
   (a) height above the earth's surface
   (b) depth below the ground
   (c) radius of the planet
   (d) None of these
13. Liquid pressure depends upon
   (a) area of the liquid surface
   (b) shape of the liquid surface
   (c) height of the liquid column
   (d) directions
14. Which of the following parameters decrease as we go up?
   (a) Density of air
   (b) Acceleration due to gravity
   (c) Atmospheric pressure
   (d) All of these
15. Consider the following statements and select the correct statement(s).
   I. If work is done on a body, then kinetic energy has to change.
   II. No work done on earth by sun when it revolves around the sun in a perfectly circular orbit
   III. K.E. can be negative
   (a) I only (b) II only
   (c) I and II (d) I, II and III
16. Cathode rays have :
   (a) only mass
   (b) only charge
   (c) neither mass nor charge
   (d) both mass and charge
17. A certain sample of element Z contains 60% of 69 Z and 40% of 71 Z. What is the relative atomic mass of element Z in this sample?
   (a) 69 :2 (b) 69.8
   (c) 70.0 (d) 70.2
18. Match the names of the scientists given in column-I with contributions towards the understanding of the atomic structure as given in column-II and choose the correct option from the codes given below.

Space for Rough Work

Column-I	Column-II
(P) Dalton	(i) Atomic number
(Q) E. Goldstein	(ii) Indivisibility of atoms
(R) Moseley	(iii) Neutrons
(S) J.Chadwick	(iv) Canal rays

(a) (P) - (ii), (Q) - (iv), (R) – (i), (S) - (iii)
(b) (P) - (ii), (Q) - (i), (R) - (iv), (S) – (iii)
(c) (P) - (iv), (Q) - (ii), (R) - (i), (S) - (iii)
(d) (P) - (iii), (Q) - (iv), (R) - (i), (S) - (ii)

19. An ion M^{3+} contains 10 electrons and 14 neutrons. Element M has valency equal to the valency of an other element X which has five electrons less than Ar in its outermost shell. Identify the elements M and X.
(a) Element M is Al and X is N
(b) Element M is N and X is Al
(c) Element M is Ne and X is B
(d) Both elements M and X are Al

20. Two elements A (atm. wt. 75) and B (atm wt. 16) combine to yield a compound. The percentage by weight of A in the compound was found to be 75.08.The formula of the compound is-
(a) AB (b) AB_2
(c) A_2B (d) A_2B_3

21. 0.202 g of a hydrocarbon compound, on combustion, gave 0.361 g of carbon dioxide and 0.47 g of water. Calculate the percentage composition of carbon :
(a) 48.76% (b) 8.07%
(c) 43.17% (d) 42.17%

22. What volume of oxygen, measured at standard conditions, can be produced by heating 10 g of potassium chlorate $KClO_3$?
(a) 7.24 l (b) 5.47 l
(c) 4.27 l (d) 2.74 l

23. Calculate the percentage of oxygen in $Al_2(SO_4)_3$
(a) 55.14% (b) 34.2%
(c) 56.14% (d) 14.56%

24. Shaving cream produces foam. What kind of colloid is shaving cream?
(a) Liquid dispersed in gas.
(b) Gas dispersed in liquid.
(c) Solid dispersed in liquid.
(d) Solid dispersed in gas.

25. Blood is _____ charged sol.
(a) negatively (b) positively
(c) neutral (d) none of these

26. At room temperature, a non-metal which is a liquid is :
(a) sulphur (b) bromine
(c) chlorine (d) nitrogen.

27. Tincture of iodine has antiseptic properties. This solution is made by dissolving :
(a) iodine in potassium iodide
(b) iodine in vaseline
(c) iodine in water
(d) iodine in alcohol

28. Which element has neither a definite shape nor a definite volume at 40ºC?
(a) Silver (b) Gallium
(c) Mercury (d) Hydrogen

29. Gas and vapour :
(a) obey the same gas laws
(b) do not obey gas laws
(c) gas obeys gas laws while vapour does not
(d) vapour obeys gas laws but not gas

30. The temperature at which Celsius and Fahrenheit scales shows the same reading is :
(a) 40°K (b) 100°F
(c) –40°C (d) –100°C

Space for Rough Work

PART - IV : BIOLOGY

1. If a cell has twice as much DNA as in a normal functional cell, it means that the cell _____.
   (a) has completed division
   (b) is preparing to divide
   (c) has ceased to function
   (d) has reached the end of its lifespan
2. Before fertilization, the egg cell in plant has
   (a) one nucleus
   (b) two nuclei
   (c) three nuclei
   (d) more than four nuclei
3. A cow's herbivorous diet indicates that it is a(n)
   (a) primary consumer.
   (b) secondary consumer.
   (c) autotrophs
   (d) decomposer
4. Secondary growth is:-
   (a) Increase in length.
   (b) Root elongation
   (c) Increase in width (Girth)
   (d) fruiting
5. RBC was kept in a solution, in few minutes it got burst, the solution was_____.
   (a) Hypertonic (b) Isotonic
   (c) Hypotonic (d) Cane sugar solution
6. The control unit of cell is
   (a) Nucleus (b) Cell wall
   (c) Cytoplasm (d) All of these
7. The cell organelle relying energy from the food is:
   (a) mitochondria (b) golgi bodies
   (c) endoplasmic reticulum
   (d) ribosomes
8. The branch of science that deals with growing plants and raising livestock for human use is
   (a) agriculture (b) horticulture
   (c) pisciculture (d) animal husbandry
9. Which of the following combinations are present in plant cell but not in animal cell
   (a) Cell Wall & Plastid
   (b) Cell wall and Cell membrane
   (c) Plastid and Nucleus
   (d) Cell Membrane and Cytoplasm
10. Which of the following is/are incorrect statement(s) regarding manure?
    (i) Manure enhances the water holding capacity of the soil
    (ii) Manure is nutrient specific i.e. supply a particular desired nutrient
    (iii) Manure decreases the number of friendly microbes
    (iv) Manure improves the texture of the soil
    (v) Manure is prepared by the decomposition of dead plant and animal matter

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

11. Which one is not a part of nucleus?
(a) Chromatin (b) Nucleolus
(c) Centrosome (d) Nucleoplasm

12. The longest cell in human body is
(a) Neuron (b) Muscle fibre
(c) Epithelial cell (d) Bone cell

13. Totipotency is a:
(a) Power of cell
(b) Its a honey bee nector.
(c) Ability of cell to form any type of cell.
(d) Dance step of mountain people

14. The flexibility in plants is due to a tissue called
(a) chlorenchyma (b) parenchyma
(c) sclerenchyma (d) collenchyma

15. The tissue present in the lining of kidney tubules and ducts of salivary glands is
(a) squamous epithelium tissue
(b) glandular epithelium tissue
(c) cuboidal epithelium tissue
(d) columnar epithelium tissue

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