CLASS
7

BVPY QUESTION PAPER – STAGE 2
Feb. 07, 2021

Part A – Mathematics (Q1 to Q30)

Part B – Science (Q1 to Q30)

Maximum Marks: 100   **Duration : 180 minutes**

Instructions for Students :

1. This paper consists two parts i.e. Part 'A' (Mathematics) Q.1 to 30, Part 'B'(Science) Q1 to 30.

2. For rough work please use last two pages.

PART 'A' (MATHEMATICS)

SECTION 1 (Maximum Marks: 15)

- This section contains Q.1 to Q. 15.
- Each question has **FOUR** options 'A', 'B', 'C' and 'D'. **ONLY ONE** of these four options is correct
- For each question, marks will be awarded in one of the following categories:

  Full Marks : +1 If only the bubble corresponding to the correct option is darkened

  Zero Marks : 0 If none of the bubbles is darkened

  Negative Marks : –0.25 In all other cases

1. If a, b, c are in continued proportion, the expression $\dfrac{a^2 + ab + b^2}{b^2 + bc + c^2}$ can be simplified to :

   A. $\dfrac{a+c}{a+b}$

   B. $\dfrac{a}{c}$

   C. $\dfrac{c}{a}$

   D. $\dfrac{a-c}{b}$

2. Which one of the following is an odd number ?

   A. $2001^2 + 3$

   B. $2002^3 + 10$

   C. $2003^2 + 7$

   D. $2004^3 + 1$

3. There is an N digit number ($N > 1$). If the sum of digits is subtracted from the number then the resulting number will be divisible by :

   A. 7

   B. 2

   C. 11

   D. 9

4. What is multiplicative inverse of $a - \dfrac{1}{a}$?

   A. $a + \dfrac{1}{a}$

   B. $\dfrac{1}{a} - a$

   C. $\dfrac{a}{a-1}$

   D. $\dfrac{a}{a^2 - 1}$

5. The median of 21 observations is 18. If two observations 15 and 24 are included to the observation, then the median of new series is :

   A. 15

   B. 18

   C. 24

   D. 16

6. In the diagram if $\triangle ABC$ and $\triangle PQR$ are equilateral. Then $\angle CXY$ equals

A. 35°
B. 40°
C. 45°
D. 50°

7. a, b, c are three numbers such that the average of a and b is 4, that of b and c is 5 and that of a and c is 12. The average of all the three numbers is :

A. 21
B. 12
C. 7
D. 5

8. In what time a capital becomes five times at the interest rate of 10%.

A. 10 years
B. 30 years
C. 40 years
D. 50 years

9. If the cost price of 12 books is the same as the selling price of 16 books, the gain or loss per cent is :

A. 15% gain
B. 25% loss
C. 20% loss
D. 30% gain

10. The ratio of the boys to girls in a class is $2 : 3$. If 20% of boys leave this class, then the new ratio of boys to girls is :

A. $8 : 15$
B. $8 : 3$
C. $3 : 7$
D. $4 : 7$

11. Which number lies between 2 and 2.5

A. $\sqrt{11}$
B. $\sqrt{3}$
C. $\sqrt{5}$
D. $\sqrt{9}$

12. Suppose that $P = 2^m$ and $Q = 3^n$. Which of the following is equal to 12^{mn} for every pair of integers (m, n) ?

A. $P^n Q^m$
B. $P^n Q^{2m}$
C. $P^{2m} Q^n$
D. $P^{2n} Q^m$

13. The rationalizing factor of $\sqrt[n]{\dfrac{a}{b}}$ is

A. $ab \sqrt[n]{\dfrac{a}{b}}$
B. $\sqrt[n]{\dfrac{a}{b}}$
C. $\sqrt[n]{\dfrac{a^{n-1}}{b^{n-1}}}$
D. $\sqrt[n]{\dfrac{a^{n+1}}{b^{n+1}}}$

14.	If the ratio of the areas of two circles is 100 : 1, then the ratio of their radii is :

A.	4 : 1	B.	1 : 8

C.	10 : 1	D.	1 : 10

15.	Name the solid figure which has no vertex and no edge.

A.	Cylinder	B.	Cone

C.	Sphere	D.	Tetrahedron

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SECTION 2 (Maximum Marks: 20)

• This section contains Q.16 to Q. 25.

• Each question has **FOUR** options 'A', 'B', 'C' and 'D'. **ONLY ONE** of these four options is correct

• For each question, marks will be awarded in one of the following categories:

Full Marks   :   +2 If only the bubble corresponding to the correct option is darkened

Zero Marks   :   0 If none of the bubbles is darkened

Negative Marks :   –0.50 In all other cases

16.	The given double bar graph shows the sale of mobile phones and cars from 2005 to 2008.
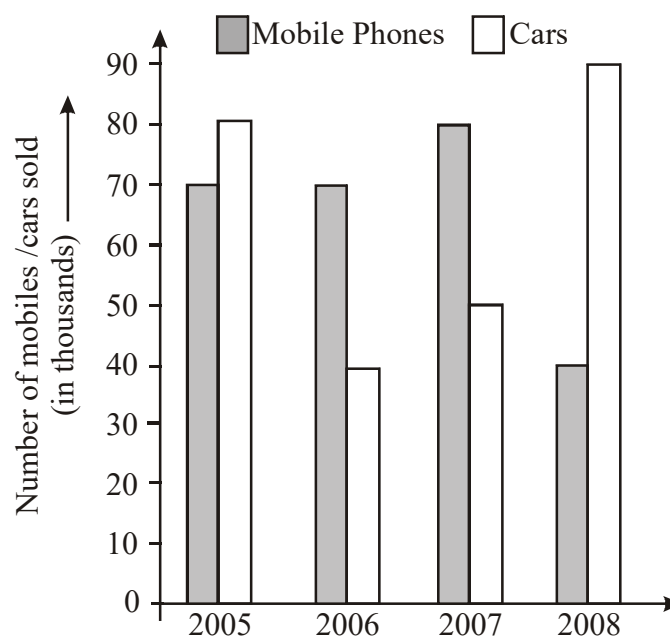
(i) Find the ratio of the total number of mobile phones sold in 2006 and 2008 to the total number of cars sold in 2005 and 2007.

(ii)What is the average number of cars sold from 2005 to 2008?

	(i)	(ii)
A.	11 : 13	65000
B.	13 : 16	72500
C.	8 : 13	97000
D.	16 : 17	89000

17. If $47.2506 = 4A + \dfrac{7}{B} + 2C + \dfrac{5}{D} + 6E$, then the value of $5A + 3B + 6C + D + 3E$ is

A. 53.6003
B. 53.603
C. 153.6003
D. 213.0003

18. Study the statements carefully

(1) Every integer is a rational number and every fraction is a rational number.

(2) A rational number $\dfrac{p}{q}$ is positive, if p and q are either both positive or both negative.

(3) A rational number $\dfrac{p}{q}$ is negative, if one of p and q is positive and other is negative.

(4) If there are two rational numbers with common denominator, then the one with the larger numerator is larger than the other.

Which of the following options hold ?

A. Both (1) and (4) are incorrect
B. Both (2) and (3) are incorrect
C. Only (1) is incorrect
D. All are correct

19. Two unbiased coins are tossed. What is the probability of getting at most 2 heads ?

A. $\dfrac{1}{4}$
B. 1
C. $\dfrac{3}{4}$
D. $\dfrac{1}{2}$

20. In the right triangle shown the sum of the distances BM and MA is equal to the distances BC and CA. If $MB = x$, $CB = h$ and $CA = d$, then x equals.
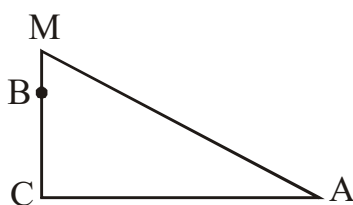
A. $\dfrac{hd}{2h+d}$
B. $d - h$
C. $h + d - \sqrt{2d}$
D. $\sqrt{h^2 + d^2} - h$

21. Answer the questions based on the given information.

In an election, there were only 2 candidates. The losing candidate received $66\frac{2}{3}\%$ of the votes the winner got. If the votes polled for loser were 60 less than that of winner, then :

(i) How many votes did the loser get ?

(ii) What per cent of the total votes did the winner get?

A. (i)200, (ii) 60   B. (i)150, (ii) 80

C. (i)120, (ii) 66.66   D. (i)160, (ii) 65

22. The third proportional to $(x^2 - y^2)$ and $(x - y)$ is :

A. $(x + y)$

B. $\dfrac{x + y}{x - y}$

C. $\dfrac{x - y}{x + y}$

D. $x^2 - y^2$

23. A sum of Rs. 1300 is divided amongst P, Q, R and S such that :

$$\frac{P's \text{ share}}{Q's \text{ share}} = \frac{Q's \text{ share}}{R's \text{ share}} = \frac{R's \text{ share}}{S's \text{ share}} = \frac{2}{3}$$
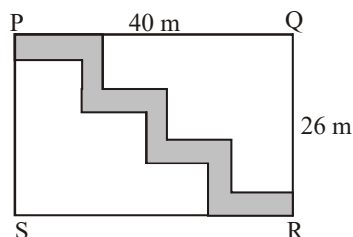
Then P's share is :

A. Rs. 140   B. Rs. 160

C. Rs. 240   D. Rs. 320

24. If $\dfrac{97}{19} = w + \dfrac{1}{x + \dfrac{1}{y}}$ where, w, x, y are integers then $w + x + y$ equals :

A. 16   B. 17

C. 18   D. 19

25. What will be the total cost (in Rs.) of levelling the shaded path of uniform width 3 m, laid in the rectangle $ABCD$ given below, where cost of levelling per m^2 is Rs.50?

A. 8450   B. 9450

C. 8250   D. 9250

26. Sum of two numbers is 45. One is twice the other.
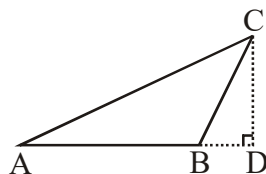
    (P) If smaller number is l, find the other number.

    (Q) Find the equation formed.

    (R) Find the numbers.

	(P)	(Q)	(R)
A.	$2l$	$l + 2l = 45$	10,35
B.	$2l$	$l + 2l = 45$	15,30
C.	$l + 2$	$45 + l + 2 = l$	15,30
D.	$l/2$	$45 + l/2 - l = 0$	25,20

27. Choose the correct option :

    (i) An obtuse – angled triangle ABC, where $AB = 10cm$, $BC = 5cm$ and height $4cm$, is given in fig. Find area of $\triangle ABC$.

    (ii) $\triangle PQR$ is isosceles with $AB = AC = 7.5cm$ and $BC = 9cm$. Find the height on equal sides.

    (iii) A polyhedron has 6 faces and 4 vertices. Find the no. of edges of the polyhedron.

    A. (i) $15cm^2$; (ii) $7cm$; (iii) 5   B. (i) $14cm^2$; (ii) $7.2cm$; (iii) 8

    C. (i) $14.5cm^2$; (ii) $6cm$; (iii) 8   D. (i) $14cm^2$; (ii) $7cm$; (iii) 8

28. State 'T' for true and 'F' for false.

    I. By SSS property two triangles can be proved congruent but not by using ASA property.

    II. If the diagonals of a quadrilateral are at right angles, the figure formed by joining the mid-points of adjacent sides is a rectangle.

III. A figure is an equiangular parallelogram if and only if it is a square.

	I	II	III
A.	T	F	T
B.	T	T	F
C.	F	T	F
D.	F	F	T

29.   Match the columns :

Column – A   **Column – B**

(i)   Additive inverse of 0   a.   10

(ii) Number of one sixth are there in $3\frac{1}{3}$ b.   0

(iii) If $2700 \times x^6 = 27 \times 10^8$, then x is   c.   20

A.   (i)-b, (ii)-c, (iii)-a B.   (i)-a, (ii)-b, (iii)-c
C.   (i)-b, (ii)-a, (iii)-c D.   (i)-c, (ii)-a, (iii)-b

30.   Match the following :

Column–I   **Column–II**

(i)   Frequency   p.   Value of the item that occurs most frequently
(ii) Circle Graph or Pie chart   q.   Compare parts of a whole.
(iii) Mode   r.   No. of times an entry occurs
A.   (i) – p, (ii) – r, (iii) – q   B.   (i) – q, (ii) – p, (iii) – r
C.   (i) – p, (ii) – q, (iii) – r   D.   (i) – r, (ii) – q, (iii) – p

PART 'B' (SCIENCE)

SECTION 1 (Maximum Marks: 15)

- This section contains Q.1 to Q. 15.
- Each question has **FOUR** options 'A', 'B', 'C' and 'D'. **ONLY ONE** of these four options is correct
- For each question, marks will be awarded in one of the following categories:

 *Full Marks*   :   +1 If only the bubble corresponding to the correct option is darkened

  Zero Marks   :   0 If none of the bubbles is darkened

  Negative Marks :   –0.25 In all other cases

1. The speed of an aeroplane A is 600 km/h . What will be speed of aeroplane in meter per second.

   A. $\dfrac{100}{3}$

   B. $\dfrac{200}{3}$

   C. $\dfrac{500}{3}$

   D. $\dfrac{400}{3}$

2. Velocity of sound in fresh water is :

   A. More than that in sea water

   B. Less than that in air

   C. Less than that in sea water

   D. More than that in alcohol

3. A musical instrument produces sound having average vibration of frequency 500 per second. The time period of vibration in seconds is :

   A. 0.002

   B. 0.02

   C. 2

   D. 500

4. Heat always flows

   A. From a body at lower temperature to a body at higher temperature.

   B. From a body at higher temperature to a body at lower temperature.

   C. Between two bodies at same temperature.

   D. Between two bodies made of the same material at any temperature.

5. The strength of electromagnet increases by :

   A. Increasing number of turns

   B. Using soft iron core

   C. Increasing current

   D. All of these

6. Which disease is most common among the workers of sericulture industry?

    A. Cancer and skin   B. Respiratory and skin

    C. Cancer and T.B.   D. None of these

7. The gas released when an acid reacts with metal carbonate or bicarbonate is -

    A. H_2 B. CO_2

    C. O_2 D. None of these

8. Which of the following is NOT a physical change?

    A. Grating cheese   B. Melting cheese

    C. Fermenting of cheese   D. Mixing two cheeses in a bowl

9. Which of the following is used in vermi-processing toilets?

    A. Cockroach   B. Earthworm

    C. Bacteria   D. None of these

10. The full form of WWTP is

    A. World Wide Transport Programme

    B. Wastewater Treatment Plant

    C. World Workers Talent Programme

    D. None of these.

11. Complete the following reaction :

$$\text{Glucose} \xrightarrow[\text{(in Muscle cells)}]{\text{Anaerobic Respiration}} \underline{\hspace{2cm}} + \text{Energy}$$

    A. Ethyl alcohol   B. Oxygen

    C. Lactic acid   D. Carbon dioxide

12. Which organisms form the symbiotic association called Lichen ?

    A. Plant root + bacteria   B. Plant root + fungus

    C. Plant root + algae   D. Algae + fungus

13. A small pore A surrounded by B takes in C and gives out D and E. What are A, B, C, D, and E, respectively ?

    A. Guard cells, stomata, CO_2, O_2 and water

    B. Stomata, guard cells, CO_2, O_2 and water

    C. Stomata, guard cells, O_2, CO_2 and water

    D. Guard cells, stomata, O_2, CO_2 and water

14. Which of the following is the pollination through water ?

A. Anemochory

B. Hydrophily

C. Hydrochory

D. Anemophily

15. Which of the following organisms have spiracles through which air enters in their body ?

A. Plants

B. Fishes

C. Mammals

D. Insects

SECTION 2 (Maximum Marks: 20)

- This section contains Q.16 to Q. 25.

- Each question has **FOUR** options 'A', 'B', 'C' and 'D'. **ONLY ONE** of these four options is correct

- For each question, marks will be awarded in one of the following categories:

   Full Marks   :   +2 If only the bubble corresponding to the correct option is darkened

   Zero Marks   :   0 If none of the bubbles is darkened

   Negative Marks :   –0.50 In all other cases

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16. A body moving with a velocity of 240 ms⁻¹ decreases to 160 ms⁻¹ in 8 seconds. The retardation of the body is

A. $10 \, ms^{-2}$.

B. $-10 \, ms^{-2}$.

C. $20 \, ms^{-2}$.

D. $-20 \, ms^{-2}$.

17. The temperature of a body on kelvin scale is found to be xK. When it in measured by a Fahrenheit thermometer, it is found to be x° F. then x is :

A. 313

B. 574.25

C. 40

D. 301.25

18. Winds near the Equator blow because-

A. Equator gets maximum heat from the Sun causing warming up of regions around the Equator.

B. Warm air rises and the cooler air from 0 – 30 degrees latitude belt on either side of the equator moves in.

C. These winds blow from the North and the South towards the equator.

D. All of these.

19. A point source of light is placed in front of a plane mirror, then :

A. all the reflected rays meet at a point when produced backward

B. only the reflected rays close to the normal meet at a point when produced backward

C. only the reflected rays making a small angle with the mirror, meet at a point when produced backward

D. light of different colours make different images

20. Read the given statements and select the correct option.

Statement 1 : Sorter's disease is an occupational hazards.

Statement 2 : In wool obtaining process, during separation of hair, person get infected by bacteria Antrax.

   A. Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.
   B. Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.
   C. Statements 1 is true but statement 2 is false.
   D. Both statement 1 and 2 are false.

21. Rima prepared an indicator paper by dipping a paper strip in a solution of X. She put a few drops of an unknown solution Y which contains H^+ ions less than OH^- ions on this paper. She observed that the colour of paper turned yellow. Identify the solution X ?

   A. Red litmus solution   B. Phenolphthalein
   C. Methyl orange   D. Turmeric solution

22. Observe the given reaction sequence carefully.

Acetic acid + Sodium hydrogen carbonate $\longrightarrow$ Sodium acetate + Water + (i)

(i) + $Ca(OH)_2$ $\longrightarrow$ (ii) + Water

What could (i) an (ii) be?

	i	**ii**
A.	$CaCO_3$	CO_2
B.	H_2O	$CaCO_3$
C.	CO_2	$CaCO_3$
D.	H_2O	CO_2

23. Observe the above figure of blood circulation and choose the correct statement among the following.
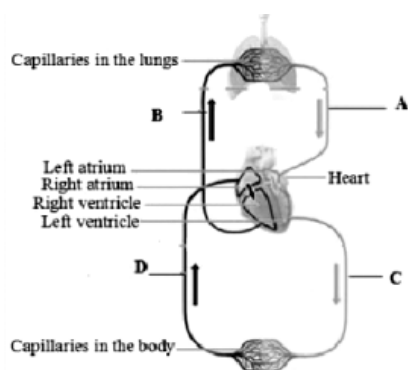
   A. B has a rigid wall.   B. A is rich in oxygenated blood.
   C. C has valves to prevent backflow.   D. D allows blood to flow in both directions.

24. Refer to the above figure and choose the correct option about A.
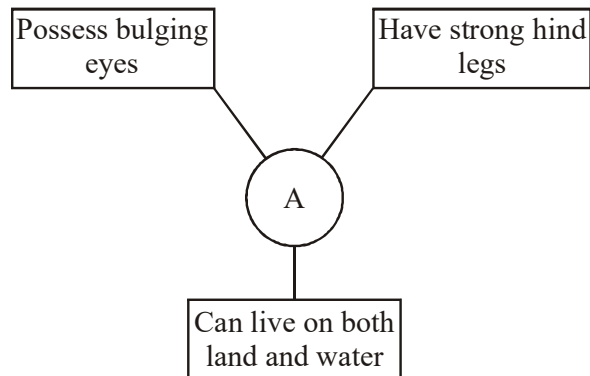
A. They have gills. B. They have slimy skin.

C. They are herbivores. D. They are streamlined.

25. While playing football, Harry falls on the ground and his knee starts to bleed. The presence of which of the following will lead to stoppage of the bleeding ?

A. Capillaries B. Plasma

C. Platelets D. Red blood cells

SECTION 3 (Maximum Marks: 15)

- This section contains Q.26 to Q. 30.
- Each question has **FOUR** options 'A', 'B', 'C' and 'D'. **ONLY ONE** of these four options is correct
- For each question, marks will be awarded in one of the following categories:

Full Marks : +3 If only the bubble corresponding to the correct option is darkened
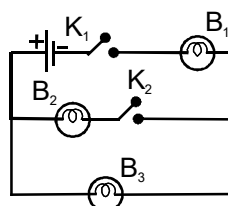
Zero Marks : 0 If none of the bubbles is darkened

Negative Marks : −1 In all other cases

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26. A ray of light is incident on a plane mirror at an angle θ. If the angle between the incident and reflected rays is 80^0, what is the value of θ ?

A. 40^0 B. 50^0

C. 45^0 D. 55^0

27. In the following circuit given below, which bulb will glow when only key k_1 is closed ?

A. Only B$_1$ B. Only B$_2$

D. Only B$_3$ D. Both B$_1$ and B$_3$

28. Raghav categorised the following household items into acids and bases.
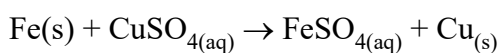
Acids	**Bases**
1. Lemon	4. Baking soda
2. Antacid	5. Vinegar
3. Tea	6. Curd

Which of them are placed under the wrong category?

A. 3 and 5   B. 2 and 6

C. 3, 4 and 5   D. 2, 5 and 6

29. Observe the given reaction carefully and fill in the blanks by selecting an appropriate option.

$$Fe(s) + CuSO_{4(aq)} \rightarrow FeSO_{4(aq)} + Cu_{(s)}$$

Before reaction, iron is __(i)__ in colour and solution is __(ii)__ in colour. After reaction iron gets __(ii)__ deposits and the solution becomes __(iv)__ in colour.

	(i)	(ii)	(iii)	(iv)
A.	Grey	Colourless	Red	Blue
B.	Red	Blue	Grey	Green
C.	Grey	Blue	Brown	Green
D.	Red	Colourless	Grey	Green

30. Refer to the above flow chart and choose the incorrect answer.
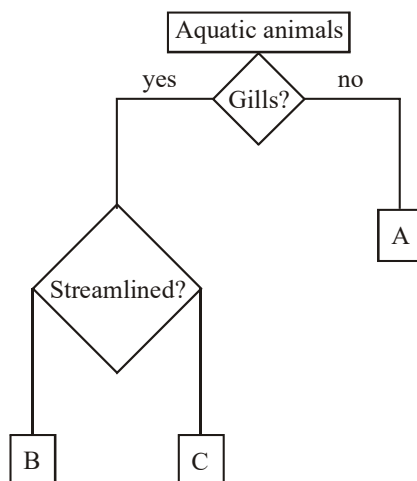
A. A animals come out of water to breathe in air.

B. C animals stay deeper in the ocean.

C. C animals possess structures called blowholes.

D. Fertilisation is external in B animals.

Space for rough work