M.M-80   **Time: 3 Hrs.**

General instructions:
1. **The paper is divided into three sections: A, B and C. All the sections are compulsory.**
2. **Separate instructions are given in each section and question, wherever necessary. Read these instructions very carefully and follow them faithfully.**
3. **Don't exceed the prescribed word limit while answering the questions.**

Section-A- Reading (20 Marks)

Q.1 **Read the passage carefully and answer the questions that follow.**

1. In my most frustrated moment of navigating chaotic Delhi traffic, I close my eyes in the back seat and imagined what it would be like if someday just a thought would transport me from one place to another.

2. At times, sitting relaxed on my terrace, I look at the green tree tops that I see every day and wonder if some day, just with the power of my thoughts I would be able to create the image of the most vivid blue ocean and sandy beach in front of me? Then having had enough of that could my thoughts switch the scene to that of Snowy Mountain peaks?

3. Just thinking of these seemingly impossible things give me a sense of well –being, because I do believe that if you can think it, you can will it and achieve it. If it occurs as a thought, it is possible to fructify as reality. After all, everything big started with a thought. Looking at birds flying freely in the sky, humans must have thoughts of the possibility of flying centuries before the invention of aeroplanes. The tallest skyscraper, the longest bridge across the ocean, the fastest train, the internet, the cell phone- all are the end result of one thought.

4. As technology advances we become more confident in our abilities to transform thoughts to reality, the gap between the ideas and implementation keeps shrinking. Today one of the biggest thrills of living is watching impossible-seeming thoughts turn to reality within one's life time!

5. If with the power of his 'Big thought' Donald Trump become the president of the USA, what then is impossible? As he says in his book, 'Think like a millionaire' "I like thinking big. To me it is very simple. If you are going to be thinking anyway, you might as well think big".

6. True. None of the big achievements or discoveries in life happened by thinking small. To achieve big stuff, you have to think big. Most people avoid thinking big because of laziness, fear of extra work and the instinct to stay unnoticed--- and hence out of trouble. A large part of the work force just wants to do their designated work and get done with it.

7. And then there are those who let their own small success become the enemy of possible bigger success, later. Sitting back to celebrate a small achievement, they underestimate their own potential whoever said that aspirations or possibilities have any limitations? The most pleasurable moment can be spent imagining what seems the impossible ---- come on; let your imagination run wild! Believe in yourself and your thoughts. Some of the tips Donald Trump shares mould yourself to think bigger are, "Walks softly but carry a big attitude, conquer your doubts and ditch them; be proud of your big ego and get into the habit of speaking of your mind".

8. The power of thought is a form of energy that is impervious to time, space and present reality. It is important to hone and direct your thoughts towards bigger and better, impossible – to – imagine things. What you believe about yourself and what you believe about possibilities is crucial to not just what you become, but also critical to the world as we all experience it ---- now and in the future.

9. Dreams and thoughts must rule free without any limitations. Thoughts have to reach beyond and encompass the impossible, the unthinkable, the weird, the unheard of and the shocking. Think beyond the realms of possibility and then aim to get there. Once there, think much beyond that possibility too. And then get going once again.

a. **On the basis of your reading of the passage, answer the following questions by choosing most appropriate option.** **1x4=4**

    i. …………………………………… that make (s) living more thrilling in modern times.
       a. Big thoughts
       b. Watching impossible- seeming thoughts turn to reality within one's life time
       c. Think small
       d. All of these

    ii. **The passage suggests that …………………………………**
       a. One should stop after making a seemingly- impossible, possible
       b. Dreams and thoughts should have limitations
       c. One should continue to think big forever
       d. Time, space and present reality affect the power of thought

    iii. …………………….. Stop (s) people from achieving big.
       a. Avoiding thinking big
       b. Sitting back to celebrate small success
       c. Underestimating their potential
       d. All of these

    iv. **The author's wish list does not include ----------------------------**
       a. Just a thought transporting her from one place to another
       b. Creating the image of blue ocean in front of her
       c. Switching the blue ocean image into that of snowy mountain peaks
       d. Feeling frustrated while navigating chaotic Delhi traffic

b. **Answer the following questions as briefly as possible.** **1x6=6**
    i. Thinking of impossible things gives the author a feeling of well- being. Why?
    ii. Why do many people don't think big?
    iii. Name any two wonderful result associated with seemingly impossible thoughts.
    iv. What prevents bigger success in case of many people?
    v. What is increasing the gap between the ideas and their implementation?
    vi. What does a large part of work force get done with?

c. **Find the words/phrases in the passage which means the same as:** **1x2=2**
    i. Qualities and abilities   (para-7)
    ii. Include, cover   (para-9)

Q2. Read the following passage and answer the questions that follow.

1. Fashion is a force – a powerful force of constantly altering patterns of change and growth. Its constant movement affects the fate of the designers and manufacturers, who distribute it and of course , the lives of the consumers, who follow what it dictates. All of its facets taken together add up to a multi million dollar industry. Fashion today means mega bucks.

2. Fashion is also a science. It involves basic facts and known principles, and its actions and reactions can be predicted as these are based on those facts and principles. Fashion is one of those distinct and unique trades that is highly dependent on the changes that are continuously taking place in it.

3. For one to make it to the top in the fashion business and stay there , one has to continue to discover and innovate to fulfil the needs and wants of the customers. For this most of the top designers such as Yves Saint Laurant, Karl Lagerfeld , Claiborne, etc., all rely upon their creativity backed by years of invaluable experience. In this line of work , instinct and intuition , play a very major role.

4. As the power of fashion influence our lives to grow up, a number of misconceptions about it continue to abound. The most common of these is that the designers and the retailers dictate what the fashion will be , and force their fancies on the helpless consumers. In reality it is the consumers themselves who dictate what the fashions will be, by either accepting and rejecting the styles and trends that are offered. They are truly, as one fashion guru once said, " "variety vultures".

5. The second misconception is that fashion acts as an influence on women only. Men today, are as much influenced by and responsive to fashion, as women. In point of fact, the male fashion industry has been

growing as a dizzying rate. Yes, there was a time when menswear was not exactly worth talking about. It was staid and unimaginative. But that does not mean that men did not dress- up according to the latest trends of the day.

6. There were changes in Western dressing that followed the dictates of the designers and the fashionable elite trends – setters. These gave the fashion world the drain pipes in the '60s, the popular safaris in the '70s, the denims in the '80s and the ethnic wear that has caught on these days.

7. Fashion today is more life style oriented and quite practical. The modern male and female want to dress differently for office and leisure. Designers are becoming more daring, the woman as well as the men folk have a wide choice. There are different designs for every moment of a busy social - schedule from work, lunch to afternoon tea, cocktails, dinner and gala banquets.

8. Lastly, fashion is the force that causes women to raise and lower their skirtlength, straighten or fizz their hair and change from sports wear to dressy clothes. Fashion is also that force that influences men to grow or shave off their mustaches and beards, choose narrow or wide ties and lapels and change from casual jeans into threer face suits and tuxedo. It is indeed this dynamic and varied force that add colour and spice to our life.

a. On the basis of your reading of the passage make notes on it using `recognizable abbreviations wherever necessary.   (5)

b.Write a summary of the above passage in not more than 80 words.   (3)

Section-B - Writing & Grammar (30 Marks)

3. You are Asmit/Asmita, Head Boy/ Head Girl of AECS 4, Rawatbhata. Write a Notice for your school Noticeboard asking the students to participate in the Science Exhibition to be held in your school . Invent necessary details.   4

OR

"Happy Morning" replaces "Good Morning" to make our feeling more vibrant and joyful. In the same way students in schools enjoy "Happy Classes" more than "Good Classes". Considering these facts, design a poster on Happy Classroom.

4. You are krishan/ Kiran studying at Hindustan School, Chennai. The road leading to your school is full of potholes causing a lot of congestion. Students and parents are often caught in a traffic jam. In spite of several representations to the concerned authorities of the Chennai Corporation, nothing has been done to improve the condition. Write a letter to the Municipal Commissioner of Chennai, requesting him to take necessary action to solve the problem at the earliest. Also offer your suggestion for improvement. (Answer in 125 - 150 words)   6

OR

Write a letter to the Editor of a national daily drawing the attention of the authorities concerned towards the problem of rising price in diesel and patrol leading to its negative impact on the economy of the common men. (Answer in 125-150 words).

5. Your school is celebrating 'Anti – Corruption Day'. Write a speech in 150 – 200 words on the topic 'minimization of Human Wants is the only way to cleanse society of all kinds of corruption'. You are Avni/ Anuj of class XI.   10

OR

In your neighbourhood, a very old man lives with his son's family. The old man leads a dependent and sorrowful life as everybody in the household remains busy with their own affairs. Write an article in 150 -200 words on the Problems of the Aged.

6.There is an error in each line of the following paragraph. Find the incorrect word and write the correct word in your answer sheet.   1x4 = 4

		Incorrect	correct
Four suspects who has	a	has	have
Been hold in connection with	b	-----	-----
The kidnapping or murder	c	------	------
Of Adnan Dede, have confess	d	------	-------

To his interrogators .   e   ------   -------

7. Arrange the jumbled words/phrases into meaningful sentences. (6x1)

         a. Without/could not have/ effort/your/we/succeeded.

         b. education/ progressive/the/is/way/discovering/of/things.

         c. What/you/do/of/think/yourself ?

         d. He/best/is/the/boy/our class/in

         e. He/the station/reached/before/had/the train/left

         f. Why/do/you/did/this/thing?

Section-C - Literature (30 Marks)

8. Read the extract given below and answer the questions that follow: 1x3=3

> The Laburnum top is silent, quite still
> In the afternoon yellow September sunlight,
> A few leaves yellowing, all its seeds fallen.

Questions:

1. Name the poet and the poem.
2. How does the tree look?
3. Why do the leaves look yellowish ?

OR

> And forever, by day and night, I back life to my own origin
> And make pure and beautify it;
> (For song, issuing its birthplace after fulfilment, wandering
> Reck'd or unreck'd , duly with love returns.

Questions:

1. Name the poet and the poem.
2. How does 'I' give life to its origin?
3. Explain the comparison with song.

9. Answer any four of the following questions in 40-50 words each.   3x3= 9

1. Why was it hard for the author to believe that his grandmother was once young and pretty ?
2. Why is the mother's laughter the poet's past ?
3. Why did the narrator call Ile Amsterdam the most beautiful island in the world ?
4. Why did Ranga say that "There's greater truth in that Shastras than we imagine" ?
5. What was Einstein's chief objection against teaching history?

10. Answer the following question in 120-150 words: 6

     Archaeology gets combined with science to give a new dimension to history. Prove this in the light of the lesson "Discovering Tut : The Saga Continues".

OR

Science and religion go together to accept the modernity and respect the traditional values. Discuss it with reference to the lesson, "Discovering Tut : The Saga Continues".

11. Answer the following question in 120-150 words:

     "We're Not Afraid to Die" is a saga of patience and bravery. Comment.   6

OR

     'Religion was the dominant feature of her life'. Comment on this statement in regard to Khushwant Singh's grandmother as projected in, "The Portrait of a Lady".

12. Answer the following question in 120-150 words: 6

     How did Mrs. Dorling acquire the possessions of Mrs. S ? What extraordinary circumstances made it possible? Do you justify Mrs. Dorling's conduct?

OR

     Einstein felt miserable in the school because of the stress of learning all the subjects of school. What should be the role of schools and teachers in making the environment stress free ?

Atomic Energy Central School No. 4 Rawatbhata

Class 11 - Physics
Half Yearly (2019-20)

Maximum Marks: 70   **Time Allowed: 3 hours**

Section A

1. An object has a length of 0.42 cm. Which of the following statements correct? **1**

   a) the uncertainty in the length is about 4% b) the uncertainty in the length is 0.01
   c) the uncertainty in the length is 0.05   d) the uncertainty in the length is ± 0.01

2. Define error. Write its types. **1**

3. As a ball rises the vertical component of its velocity **1**

   a) Can't be determined   b) Remains constant
   c) Increase   d) Decrease

4. Momentum of a body is **1**

   a) a vector equal in magnitude to the   b) a scalar equal in magnitude to the
   product of mass and instantaneous velocity product of mass and velocity
   and direction being that of instantaneous
   velocity

   c) a vector equal in magnitude to the   d) a vector equal in magnitude to the
   product of mass and average speed and   product of mass and acceleration and
   direction being that of velocity   direction being that of velocity

5. Write S.I unit of luminous intensity and temperature. **1**

6. Fill in the blanks: **1**

   The dimensional formula for torque is _____.

7. How many parsec are there in one metre? **1**

<div align="center">OR</div>

   Convet :

   i. 3.0m/s^2 = ... km/hr^2

   ii. 6.67 10^{-11}Nm^2/kg^2 = ... g^{-1}cm^{3}s^{-2}

8. What are the dimensions of a and b in the relation: F = a + bx, where F is force and (x) is distance? **1**

9. An object is said to be in uniform motion in a straight line if its displacement **1**

   a) is decreasing in equal intervals of time   b) is equal in not equal intervals of time.
   c) is increasing in equal intervals of time   d) is equal in equal intervals of time.

10. What are the applications of dimensional analysis? **1**

11. Two particles A and B are moving along the same straight line. B is ahead of A Velocities remaining **1**
    unchanged, what would be the effect on the magnitude of relative velocity if A ahead of B?

12. Can speed of an object be negative? Justify. **1**

<div align="center">OR</div>

    The displacement - time graph of a particle is parallel to time - axis, what is the velocity of the particle?

13. If $A_x, A_y \ and \ A_z$ are x, y and z components of a vector then its magnitude is **1**

    a) $\sqrt{A_x^2 + 2A_y^2 + A_z^2}$ b) $\sqrt{A_x^2 + A_y^2 + A_z^2}$

    c) $\sqrt{3A_x^2 + A_y^2 + A_z^2}$ d) $\sqrt{A_x^2 + A_y^2 + A_z^3}$

14. The addition of vectors and the multiplication of a vector by a scalar together gives rise to **1**

    a) distributive laws   b) commutative law
    c) asymmetric laws   d) intransitive law

15. Give an example of a body moving with uniform speed but having a variable velocity and an acceleration **1**
    which remains constant in magnitude but changes in direction.

16. What is the unit vector perpendicular to the plane of vectors $\vec{A}$ and $\vec{B}$? **1**

OR

Two bodies are projected at an angle θ and $(\pi/2 - \theta)$ to the horizontal with the same speed. Find the ratio of their time of flight.

17. A body is acted upon by a number of external forces. Can it remain at rest? **1**
18. A soda water bottle is falling freely. Will the bubbles of the gas rise in the water of the bottle? **1**
19. Explain why passengers are thrown forward form their seats when a speeding bus stops suddenly. **1**
20. Why does a swimmer push the water backwards? **1**

OR

Which of the following is scalar quantity? Inertia, force and linear momentum.

Section B

21. If the displacement of a body is S = (200 ± 0.5) m and time taken by it is t = (20 ± 0.2) s, then find the percentage error in the calculation of velocity. **2**

OR

The mass of a box measured by a grocer's balance is 2.300 kg. Two gold pieces of masses 20.15 g and 20.17 g are added to the box. What is (a) the total mass of the box, (b) the difference in the masses of the pieces to correct significant figures?

22. Write the characteristics of displacement. **2**
23. Draw the displacement time graph for a uniformly accelerated motion. **2**
24. A cricketer can throw a ball to a maximum horizontal distance of 100 m. How much high above the ground can the cricketer throw the same ball ? **2**
25. A stone is thrown vertically upwards and then it returns to the thrower. Is it a projectile? Explain. **2**

OR

What is the angle of projection at which horizontal range and maximum height are equal?

26. How does banking of roads reduce wear and tear of the tyres? **2**
27. Give the magnitude and direction of the net force acting on **2**

   a. A drop of rain falling down with constant speed.
    b. A kite skillfully held stationary in the sky.

Section C

28. The wavelength λ associated with a moving particle depends upon its mass m, its velocity v and Planck's constant h. Show dimensional relation between them. **3**

29. Derive (i) v = u + at (ii) $v^2 - u^2 = 2as$ by calculus method. **3**
30. The velocity-displacement graph of a particle is shown in the figure. **3**
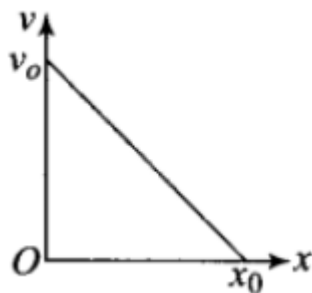
    a. Write the relation between v and x.
    b. Obtain the relation between acceleration and displacement and plot it.

OR

A boy standing on a stationary lift (open from above) throws a ball upwards with the maximum initial speed he can, equal to 49 m/s. How much time does the ball take to return to his hands? If the lift starts moving up with a uniform speed of 5 m/s and the boy again throws the ball up with the maximum speed he can, how long does the ball take to return to his hands?

31. Define horizontal range and flight time. Derive the relation for both. **3**

OR

What is angle of friction and angle of repose?Show how angle of friction and angle of repose are same at equilibrium?

32. Rain is falling vertically with a speed of 30 ms^{-1}. A woman rides a bicycle with a speed of 10 ms^{-1} in the **3**

north to south direction. What is the direction in which she should hold her umbrella? **3**

33. State and prove the principle of law of conservation of linear momentum. **3**

34 Explain impulse momentum theorem. Explain why wicket kipper in cricket pulls his hands in backward

Section D

35. Define centripetal force and explain its cause. Derive the formula of centripetal force and explain its direction **5**

OR

Write the triangle law of vector addition and derive the formula of resultant sum of two vectors.draw necessary diagram.

36. What do you mean by vector resolution and explain the vector resolution in three dimensional space . **5**

OR

A ball is thrown upward with an initial velocity of 100 m/s. After how much time will it return? Draw velocity-time graph for the ball and find from the graph.

i. Maximum height attained by the ball.

ii. Height of the ball after 15 s. Take g = 10 ms-1.

37. What is banking of road? Angle of Banking? Derive the expression for safe speed of the vehicle on banked road. Also define optimum speed with the expression. **5**

OR

A man of mass 'm' kg stands on a weighing scale in a lift which is moving

1. upwards with uniform speed of 'v' m/s?

2. downwards with a uniform acceleration of 'a' m/s2?

3. upwards with uniform acceleration of 'a' m/s2.

What would be the readings on the scale in each case? Also, What would be the reading if the lift mechanism failed and it hurtled down freely under gravity? When a man is standing on a weighing scale, it will read the normal reaction R as apparent weight.

Maximum Marks: 70   **Time Allowed: 3 hours**

General Instructions:
1. All questions are compulsory.
2. There are 37 questions in total. Questions 1 to 20 carry one mark each, quessstions 21 to 27 carry two marks each, questions 28 to 34carry three marks each & questions 35 to 37 carry five marks each.
3. There is no overall choice. However, an internal choice has been provided in three questions of one marks, two questions of two marks, two questions of three marks & all three questions of five marks each.
4. Use of calculator is not permitted.

<div align="center">

Section A

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1. Molarity is defined as,   1

   a) the number of moles of the solute in 1m3 of the solution

   b) the number of moles of the solvent in 1litre of the solution

   c) the number of moles of the solute in 1litre of the solution

   d) the number of grams of the solute in 1litre of the solution

2. Isobars are the atoms with   1

   a) same atomic number but different mass Number

   b) same mass number but different atomic number

   c) same number of neutrons but different mass number

   d) same atomic number but different number of neutrons

3. Mg^{2+} is isoelectronic with   1

   a. Zn^{2+} b. Cu^{2+} c. Ca^{2+} d. Na^{+}

4. Surface tension results because   1

   a) surface molecules have different Properties

   b) a liquid tends to minimize the number of molecules at the surface

   c) a liquid tends to increase the number of molecules at the surface

   d) a liquid tends to maximize the number of molecules at the surface

5. Isostructural species are those which have the same shape and hybridisation. Among the given species identify the isostructural pairs.

   a) $[BF_4^{-}\ and\ NH_4^{+}]$ b) $[NF_3\ and\ BF_3]$ c) $[BCl_3$ and $BrCl_3]$ d) $[NH_3\ and\ NO_3^{-}]$ 1

6. What is the role of a chemical 'taxol' in human body?   1

7. What is the S.I. unit of mass? Write its symbol.   1

8. State " law of conservation of mass" .   1

9. Arrange X-rays, cosmic rays and radio waves according to frequency.   1

10. The bromine atom possesses 35 electrons. It contains 6 electrons in 2p orbital, 6 electron in 3p orbital and 5 electrons in 4p orbital. Which of these electrons experience low effective nuclear charge?   1

11. How many sub-shells are associated with n = 4? 1

OR

An electron beam after hitting a neutral crystal produces a diffraction pattern? What do you conclude? 1

12. Which two elements of the following belong to the same period? Al, Si, Ba and O 1

13. Which has a larger radius? (i) Mg or Ca (ii) S or Cl 1

14. Define the bond Length. 1

15. Why ethyl alcohol is completely miscible with water? 1

16. Predict the shape of the following molecules using VSEPR theory? $BeCl_2$, $SiCl_4$ 1

17. When does a liquid boil? 1

18. What is the expression for ideal gas equation? 1

19. Write the statement of Boyle's Law. 1

OR

State Gay Lussac's law.

20. Find the group & period for an element whose outer configuration is $4s^2 3d^5$? 1

OR

How many number of periods and groups in modern periodic table

Section B

21. Calculate: Mass of 2.5 gram atoms of magnesium? 2

22. Give the relation between wavelength and momentum of moving the microscopic particle. What is the relation known as? 2

23. Using s, p and d notations, describe the orbitals with following quantum numbers : 2
(a) n = 1, l = 0, (b) n = 4, l = 3 (c) n = 3, l = 1 (d) n = 4, l = 2

24. The unpaired electrons in Al and Si are present in 3p orbital. Which electrons were experience more effective nuclear charge from the nucleus? 2

OR

What are the shapes of 3s and 3p orbitals? How many total nodes are present in these orbitals?

25. Which of the following pairs of elements would have more negative electron gain enthalpy? 2
(i). O or F (ii). F or Cl

26. On the basis of quantum numbers, justify that the sixth period of the periodic table should have 32-elements. 2

27. What are representative element? 2

OR

What are inner transition metals? Why are they called rare earth metals?

Section C

28. A flask P contains 0.5 mole of oxygen gas. Another flask Q contains 0.4 mole of ozone gas. Which of the two flasks contains greater number of oxygen atoms? 3

OR

Define the following-

(i). Mole fraction   (ii). Molality   (iii)Mole

29.   A. What do you mean Empirical formulae and molecular formulae? Give relation between them.   3

       B. The molecular mass of a compound containing 4.07% hydrogen, 24.27. % carbon and 71.65% chlorine. Its molar mass is 98.96. What are its empirical and molecular formula of the compound?

30 Explain ionization enthalpy and Explain why   3

(i)Nobel gases have higher value of ΔiH

(ii)O has lower value of ΔiH than N ?

31 What is dipole moment? Which out of NH_3 and NF_3 has a higher dipole moment and why?   3

32 What are Lewis structures? Write the Lewis Structure of Cl_2 , BeF_2 , H_2O.   3

<div align="center">OR</div>

         a. Sigma bond is more stronger than pi bond, why?

         b. All bonds in PCl_5 are not equal. Explain.

         c. Which one is more ionic out of NaCl or NaI and why?

33 Give reason: 3

         a. Falling liquid drops are spherical.

         b. The thicknesses of Glass Window pans of old building are thicker at the bottom than at the top.

         c. Sharp glass edges heated to make smooth?

34. In terms of Charle's law explain why -273 C is the lowest possible temperature.   3

<div align="center">**Section D**</div>

35. State and explain the following: 5

          i. Aufbau principle

          ii. Pauli exclusion principle

          iii. Hund's rule of maximum multiplicity

          iv. n + l rule

          v. Degenerate orbit

<div align="center">**OR**</div>

   i. Write electronic configuration of Cu^+ ion (Z of Cu+ = 29). Write the values of 'l' and 'm_l' for $4s^1$ electron.

   ii. What is photoelectric effect? Write mathematical expression also. The threshold frequency for a metal is 7×10^{14} s^{-1}. Calculate the kinetic energy of an electron emitted when radiation of frequency $v = 1 \times 10^{14} s^{-1}$

36. a.   Discuss the orbital structures of the following molecules on the basis of hybridization.   5

      i BH_3 ii. C_2H_2 iii. CH_4

   b.   Drawresonating structures of carbonate ion.

<div align="center">**OR**</div>

   i. What is hydrogen bond? Explain the different types of H- bond with suitable examples

   ii. Write MO configuration of O_2 molecule. Calculate its bond order and write its magnetic nature.
     .

37. a) State and explain Dalton's law of partial pressures. Can Dalton's law of partial pressures be applied to a mixture of carbon monoxide and oxygen?   5

   b) At 0°C the density of a gaseous oxide at 2 bar is same as that of nitrogen at 5 bar. What is the molecular mass of the oxide?

<div align="center">**OR**</div>

   A. Write the causes for deviation from ideal behavior and explain the modification made in the ideal gas equation

   B. What do a and b represent in Vander Waals equation?

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Atomic Energy Central School No. 4 Rawatbhata

Class 11 - Mathematics
Half Yearly Examination (2019-20)

Maximum Marks: 80   **Time Allowed: 3 hours**

General Instructions:

a) All the questions are compulsory.

b) There are 37 questions in total.

c) Section A contains 20 objective answer type questions and carry one mark each. These answers

d) Section B contains 7 questions of two marks each.

e) Section C contains 7 questions of four marks each.

f) Section D contains 3 questions of six marks each..

g) There is no overall choice. However, an internal choice has been provided in some of the questions. You have to attempt only one of the choices in such questions.

h) Use of calculators is not permitted. However, you may use log tables if necessary.

Section A

1. if A = { x : x is a multiple of 3 } and B = { x : x is a multiple of 5 } , then A – B is   1

    a) $A \cap B'$ b) $A' \cap B'$
    c) $(A \cap B)'$ d) $A' \cap B$

2. In a set builder method the null set is represented by   1

    a) { x : x = x }   b) { }
    c) ϕ d) {x: x $\neq$ x }

3. Given the sets A = { 1, 2, 3 } , B = { 3 , 4 } , C = { 4 , 5, 6 } , then A $\cup$ (B $\cap$ C) is   1

    a) {1, 2, 3}   b) { 3 }
    c) { 1, 2 ,3 , 4, 5, 6 }   d) { 1, 2 , 3 , 4 }

4. If A = {(x, y) : $x^2 + y^2 = 5$ } and B = {(x, y) : 2x = 5y}, then $A \cap B$ contains   1

    a) two points   b) one-point
    c) infinite points   d) no point

5. If A = {a, b}, B = {c,d}, C = {d, e} then {(a, c), (a, d), (a,e), (b,c), (b, d), (b, e)} is equal to   1

    a) $A \cap (B \cup C)$ b) $A \times (B \cap C)$
    c) $A \cup (B \cap C)$ d) $A \times (B \cup C)$

6. The domain of the function $f(x) = \sqrt{x-1} + \sqrt{6-x}$ 1

    a) (-∞, 6)   b) [1, 6]
    c) [1, 6]   d) none of these

7. The general solution of tan 3x = 1 is (n $\in$ I)   1

    a) $n\pi \pm \frac{\pi}{4}$ b) $\frac{n\pi}{3} + \frac{\pi}{12}$
    c) nπ d) $n\pi + \frac{\pi}{4}$

8. The value of the expression tan 1° tan 2° tan 3° ... tan 89° is equal to   1

    a) 0   b) not defined
    c) ∞ d) 1

9. $\sin (180 + \phi) \sin(180 - \phi) \, cosec^2 \phi$ 1

    a) 1   b) - 1

c) 0   d) none of these

If $\tan\theta + \sec\theta = \sqrt{3}, 0 < \theta < \pi$, then θ is equal to

a) $\frac{\pi}{6}$ b) $\frac{2\pi}{3}$

c) $\frac{5\pi}{6}$ d) $\frac{\pi}{3}$

10. For each $n \in N, a^{2n-1} + b^{2n-1}$ is divisible by :   **1**

   a) none of these.   b) $(a+b)^2$

   c) $(a+b)^3$ d) a + b

11. For $n \in N, 3^{2n+2} - 2^3 n - 9$ is divisible by   **1**

   a) 81   b) 3

   c) 64   d) 9

12. The least value of n for which $\left(\frac{1+i}{1-i}\right)^n$ is a positive integer is   **1**

   a) 8   b) 1

   c) 2   d) 4

13. If $z = \frac{\sqrt{3}+i}{2}$, then z^{69} is equal to   **1**

   a) i   b) -i

   c) 1   d) none of these

14. If z = $\bar{z}$, then   **1**

   a) none of these   b) z is a complex number

   c) z is purely real   d) z is purely imaginary

15. Region represented by the system x $\geq$ 0 , y $\geq$ 0 of inequations is   **1**

   a) none of these.   b) 3rd quadrant

   c) 2nd quadrant   d) 1st quadrant

16. If a , b , c are real numbers such that a $>$ b , c $<$ 0   **1**

   a) ac $>$ bc   b) ac $<$ bc

   c) ac $\geq$ bc   d) none of these

17. Solve the system of inequalities x $-$ 2 $>$ 0 , 3x $<$ 18   **1**

   a) 2 $<$ x $<$ 6   b) 1 $<$ x $<$ 3

   c) 3 $<$ x $<$ 18   d) -6 $<$ x $<$ -2

If a , b , c are real numbers such that a $<$ b , c $\geq$ 0, then

   a) none of these   b) ac $\leq$ bc

   c) ac $>$ bc   d) ac $<$ bc

18. If P(n,r) = C(n,r) then   **1**

   a) r = 0 or 2   b) r = 1 or n

   c) r = 0 or 1   d) n = r

19. 20 students can compete for a race. The number of ways in which they can win the first three places is (given that no two students finish in the same place)   **1**

   a) 1140   b) 8000

   c) 6840   d) none of these.

20. Fill in the blanks: **1**

   The total number of ways in which three persons can be seated in a row containing seven seats is _____.

Fill in the blanks:

   A _____ is an arrangement in a definite order of a number of objects taken some or all at a time.

Section B

21. If A = {x : x is a natural number}, B = {x : x is an even natural number}, C = {x : x is an odd natural number} and D = {x : x is a prime number}, find: $A \cap D$ 2

22. If A and B are any two non-empty sets, then prove that $A \times B = B \times A \Leftrightarrow A = B$ **2**
23. If cos $\theta + \phi$) = m cos $(\theta - \phi)$, then find the value of $\frac{1-m}{1+m} \cot \phi$. **2**

OR

Prove $\cos^2 2x - \cos^2 6x = \sin 4x \sin 8x$

24. Expand the given expression (1 - 2x) **2**

OR

Expand $\left(x^2 + \frac{3}{x}\right)^4, x \neq 0$

25. Find real   such that $\frac{+2i \sin \theta}{-2i \sin \theta}$ is purely real. **2**
26. Solve $3x - 2| \leq \frac{1}{2}$. **2**
27. How many 4-letter codes can be formed using the first 10 letters of the English alphabet, if no letter can be repeated? **2**

OR

Prove that n (n - 1) (n - 2)... (n - r + 1) = $\frac{n!}{(n-r)!}$

Section C

28. Let A, B and C be the sets such that $A \cup B = A \cup C$ and $A \cap B = A \cap C$ Show that B = C. **4**

OR

Let A, B and C be three sets, then prove that: $A - (B - C) = (A - B) \cap (A \cap C)$

29. For any four sets A, B, C, D, prove that $A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$. **4**

OR

Let f = {(1, 1), (2, 3), (0, - 1), - 1, - 3)} be a function from Z to Z defined by f (x) = ax + b for some integers a, b. Determine a,b.

30. Prove that: cos x + cos (x +)⊢ cos (x -) =—   — **4**
31. Using the Principle of Mathematical Induction, prove that 3 $^{n+2}$ - 8n - 9 is divisible by 8, for all n $\in$N. **4**
32. If   and   are different complex numbers with $\beta| = 1$ then find $\left| \frac{\beta - \alpha}{1 - \bar{\alpha}\beta} \right|$ Here α and β are different complex numbers such that $|\beta| = 1$. **4**

OR

If (x + iy)^3 = u + iv, then show that $\frac{u}{x} + \frac{v}{y} = 4(x^2 - y^2)$

33. In how many different ways, the letters of the word 'ALGEBRA' can be arranged in a row if **4**
   i. the two A's are together?
   ii. the two A's are not together?

34. Find (x + 1) + (x - 1) . Hence or otherwise evaluate $\sqrt{2} + 1)^6 + (\sqrt{2} - 1)^6$ **4**

Section D

35. If   and   be the two distinct real numbers satisfying the equation a cos + b sin = c, then prove that sin $(\alpha + \beta) = \frac{2ab}{a^2+b^2}$ and $\sin \alpha \cdot \sin \beta = \frac{c^s - a^2}{a^2+b^2}$ **6**

OR

If A + B + C = π, then prove that $\frac{\cos A}{\sin B \cdot \sin C} + \frac{\cos B}{\sin C \cdot \sin A} + \frac{\cos C}{\sin A \cdot \sin B}$ = 2.

36. Solve the following system of inequations graphically: 12x + 12y 840, 3x + 6y 300, 8x + 4y 480, x $\geq$ 0, y $\geq$ 0 **6**
37. Answer the following questions **6**
   a) Draw graph and find the domain and range of the function f (x) = 1-|x - 3|

   b) Find the domain and the range of the function f(x) = $\sqrt{16 - x^2}$

Atomic Energy Central School No. 4 Rawatbhata

Class 11 - Biology
Half Yearly (2019-20)

Maximum Marks: 70   **Time Allowed: 3 hours**

Section A

1. Which one is less general in characteristic as compared to genus   **1**

        a) Class   b) Division
        c) Family   d) Species

2. Virus is neither living nor non living. Is it true or false?   **1**

    OR

    Which is the special organ in Angiosperms which bear sexual parts?

3. Which organ is responsible for excretion in Arthropoda?   **1**

4. Which is the only organelle found in a prokaryotic cell?   **1**

5. Name some secondary metabolites which are useful for human.   **1**

    OR

    Can there be mitosis without DNA replication in 'S' phase?

Section B

6. How is a key helpful in the identification and classification of an organisms?   **2**

7. Write short notes on: Importance of Angiosperms   **2**

    OR

    Cynobacteria plays a major role in our ecology. Discuss.

8. On the basis of which characters you can say that Aschelminthes are more advanced compared to Platyhelminthes?   **2**

9. What is a mesosome in a prokaryotic cell? Mention the functions that it performs.   **2**

    OR

    Define cytoskeleton.

10. What is the importance of analysis of chemical composition?   **2**

11. Meiosis division occurs in which parts of a flowering plant? Why?   **2**

12. Distinguish cytokinesis from karyokinesis.   **2**

Section C

13. What is the importance of taxonomical aids? Describe various taxonomically aids.   **3**

    OR

    Write short notes on following:
    Phylum, Order, Gnus and Species.

14. Find out what do the terms 'algal bloom' and 'red tides' signify.   **3**

15. Give a brief account of viruses with respect to their structure and nature of genetic material. Also name four common viral diseases.   **3**

16. Evaluate how did the development of plants, from algae to angiosperms may have taken place.   **3**

17. When and where does reduction division take place in the life cycle of a liverwort, a moss a fern a gymnosperm and an angiosperm?   **3**

    OR

    Differentiate between prokaryotic and eukaryotic cells.

18. If you are given a specimen, what are the steps that you would follow to classify it?   **3**

    OR

    Find examples where the four daughter cells from meiosis are equal in size and where they are found unequal in size.

19. Name two cell organelles that are double membrane-bound. What are the characteristics of these two organelles? State their functions and draw labelled diagrams of both.   **3**

20. What is the importance of vacuoles in Amoeba?   **3**

21. Give a brief description of nucleic acid. **3**
22. Explain classification of enzymes. **3**
23. Describe the events taking place during interphase. **3**
24. Give diagrammatic representation of the stages in meiotic cell division. **3**

Section D

25. How does biodiversity of a geographical location influence the classification of plant and animal species present in that location? **5**

OR

Describe key features of class Mammalia. Discuss how these features enable them to be at the top of the evolutionary pyramid.

26. What are the characteristics of prokaryotic cells. **5**

OR

Describe major features of Plant Kingdom.

27. Describe the concept of metabolism. What are anabolic and catabolic pathways? **5**

OR

Describe prophase I of meiotic cell division. How is it different from prophase II of meiosis?

Atomic Energy Central School No-4, Rawatbhata
Half Yearly Examination, 2019-20

Class: XI   **Subject: Computer Science with Python**

Time allowed: 3 hours   *Maximum Marks: 70*

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1. a) Classify the software?   [2]
   b) Draw the block diagram of the computer system?   [2]
   c) Draw the block diagram of the mobile system and explain its basic units?   [4]
   d) Name the various types of ROMs?   [2]
   e) Convert the 3.4TB in KB.   [1]
   f) Name various internal memories?   [1]

   OR

   Differentiate between data and information, give example?

2. a) Write the binary number $(-100110100)_2$ into   [2]
       i)   2's Complement Form
       ii)   1's Complement Form
   b) Find the following: *(Binary Addition and Subtraction)*   [2]
       i)   1001011 + 1001111= ?
       ii)   1100101 + 1100101 = ?
       iii)   11001100 − 10001011 = ?
       iv)   10110000 − 10010011 = ?
   c) Convert the following number systems: [4]
       i) $(1100111.11)_2 = (?)_8$
       ii) $(664.53)_8 = (?)_{16}$
       iii) $(7A.4B)_{16} = (?)_{10}$
       iv) $(399.004)_{10} = (?)_2$

3. a) Draw Truth Table for $X(Y' +Z') + XY'$ [2]
   b) Define the principal of Duality and find the dual of $X' + 1.Y'$ [2]
   c) State the Demorgan's Theorem and proves any one by using TT.   [3]
   d) Draw the logic Circuit Diagram for the Boolean expression: $ab'c + a'c' + ab'c'$ [1]
   e) Draw the symbol for Ex-OR Gate and draw its truth table.   [1]

4. a) Classify the Tokens of Python? Explain them in brief?   [3]
   b) What is floating point type literal, explain its types with example?   [2]

   OR

   What are comments? How do you type comments in python give examples?
   d) Name the barebones (parts) of the Python Programs?   [2]
   e) find error: (correct this justify your answer)   [1]
      20=a
      2**3 = b
   f) How do you define/declare a variable in python, give example?   [1]

   OR

   Give a suitable example for assigning multiple values to multiple variables.
   h) What will be the output produced by the following code?
   1) value='amit'   [1]
   age=18
   print value,", you are ",age, " now \n"
   print "You will be",age+2," after two years"
   2) print(bool(''))   [1]
      print(bool('0'))

1

3) print(17%5)   [1]
   print(17//5)

4) Define the use of id()? Will the output of following prints results same?   [1]
num=13
print(id(num))
num=num+3
print(id(num))

5.   a) What is type casting? How do you do manually in python programs, give examples?   [2]
      b) How do we write complex numbers in python, give example?   [1]
      c) What is the use of ceil () and floor () function, illustrate with a suitable example?   [2]
        OR
        Write an example to declare list and tuples variables in python?
      d) Differentiate between mutable and immutable data types give examples?   [1]
      e) Classify the data types in python?   [1]
      f) Convert the following algebraic statement into python statements: [4]

        i) $D=\sqrt{2x\sqrt{s^2+b^2}}$
        ii) $\frac{1}{3}\pi b^2 h$
        iii) $2x\log_{10} y$
        iv) $\sin 2x + \cos y^2$

6.   a) Find error: (Justify your errors)   [2]
        i)   marks=input('Enter percentage marks:)
               i/p: Enter percentage marks: 79.9%
        ii)   a=30
               b=a + b
               print (a & b)

      b) Draw a flow chart to find the compound interest value.   [3]
      c) Print a random number from 14 to 42 with the step difference of 3, write suitable   [1]
        statements?
        OR
        How do you find a mode of a given sequence, illustrate with a suitable example?

7.   a) WAP to enter the radius and display the volume of sphere   [2]
      b) WAP to enter the cost of product and calculate the GST and net price. If the cost of product   [3]
        is >=10000 then GST is 18% otherwise GST is 12%. [net price = cost + GST]
      c) WAP to enter the percentage marks of a student and find its grade by using the following   [3]
        criteria:
        Marks>90 then Grade='A'
        60<Marks<90 then Grade='B' otherwise Grade='C'
        Display the grade at output.
      d) WAP to enter the three sides of a triangle and calculate its area by using the Herons   [3]
        formula.

Atomic Energy Central School No. 4 Rawatbhata

Class 11 - Physical Education

Half Yearly(2019-20)

Maximum Marks: 70   **Time Allowed: 3 hours**

General Instructions :
*(i) The question paper contains **26** questions.*
*(ii) **All** questions are compulsory.*
*(iii) Questions no. **1 -11** carry **1** mark each. Answers to these questions should be*
*   in approximately **20 – 30** words each.*
*(iv) Questions no. **12** to **19** carry **3** marks each. Answers to these questions should*
*   be in approximately **80 – 100** words each.*
*(v) Questions no. **20** to **26** carry **5** marks each. Answers to these questions should*
*   be in approximately **150 – 200** words each.*

Section A

1. What is the aim of physical education?   **1**

2. What do you mean by Health-related careers?   **1**

OR

What do you mean by physical education?

3. Where will the Olympic game be held in the year 2020?   **1**

4. What do you mean by wellness?   **1**

5. What do you mean by lifestyle?   **1**

OR

What are the importances of wellness?

6. What is integrated physical education?   **1**

7. What is inclusion?   **1**

8. What are the two benefits of inclusive education?   **1**

9. What is Yoga Nidra?   **1**

10. Define yoga.   **1**

11 What is Dhayana or concentration?

Section B

12. Write a note on career in sport Industry?   **3**

13. Briefly discuss about Dronacharya Award?   **3**

14. Describe the importance of healthy positive lifestyle.   **3**

15. Discuss **healthy diet** as a component of positive lifestyle.   **3**

16. How can we implement inclusive education in physical education?   **3**

17. What is the contribution for special education teacher in developing **3**

    education plans for special need children?

OR

Describe the principles of integrated and comprehensive physical education.

18. Explain in detail the steps, benefits and precautions during Sukhasana. **3**

19. What is the procedure, precautions and benefits of Tadasana? **3**

OR

How to get ready for a Yoga Nidra?

Section C

20. Give a brief account of the ancient Olympic Games. **5**

21. Enlist the various sports awards and Explain any one award in detail? **5**

22. What are the main objectives of physical education? **5**

23. Describe the components of wellness? **5**

OR

Explain the component of physical fitness.

24. Explain the concept of Inclusion. **5**

25. What is the role of occupational therapist for special need children? **5**

26. Explain the benefits of Yog Nidra in detail. **5**

OR

What is the procedure to do a perfect Yog Nidra?

खण्ड -क

1 निम्नलिखित गदयांश को पढ़कर पूछे गए प्रश्नों के उत्तर लिखिए :

हमें अंग्रेजी से कोई गिला शिकवा नहीं है , अंग्रेजी की प्रभुता से है । प्रभुता हम हिन्दी को भी नहीं देना चाहते । उसे एक विशेष प्रयोजन के लिए संपर्क भाषा के रूप मे स्वीकार करते हैं , पर किसी दूसरी भाषा को कुचल कर , दबाकर या उसके हितों की अनदेखी कर नहीं । राज्य विशेष मे उसके दैनिक व्यवहार के लिए उसी की भाषा उत्तम है । वहां हिन्दी को दखल नहीं देना । देश के स्वभाव और आवश्यकता के लिए हिंदी अपरिहार्य है; आज से नहीं लगभग एक हजार वर्षों से । दो भिन्न भाषा -भाषी

परस्पर संवाद के लिए हिन्दी का ही सहारा लेते हैं । कुछ अंग्रेजी पढे लोग अब अंग्रेजी का प्रयोग करने लगे हैं पर आम जन से बात करने में उनकी अंग्रेजी व्यर्थ हो जाती है और वे पुन; हिन्दी का सहारा लेते हैं । भारत के स्वभाव में द्विभाषिकता हैं । आज यातायात और दूरसंचार के माध्यमों के विकास से हिंदी संपर्क - भाषा की भूमिका बढ़ रही है , पर ऐसा नहीं है कि राज्य विशेष में उस राज्य की भाषा उपेक्षित हो रही है । सभी भारतीय भाषाओं की उपेक्षा का कारण अंग्रेजी को अनावश्यक महत्व देना है ।

(क) अंग्रेजी की प्रभुता का क्या आशय है ?   2

(ख) दो भिन्न भाषा - भाषी परस्पर व्यवहार के लिए किस भाषा का प्रयोग करते हैं और क्यों ?   2

(ग) संपर्क भाषा के रूप मे हिंदी की क्या भूमिका होगी ?   2

(घ) अंग्रेजीदां लोगों को भी हिन्दी का सहारा कब लेना पड़ता है ?   2

(ङ) भारतीय भाषाओं की उपेक्षा का कारण आपके मत मे क्या है ?   1

(च) देश की आवश्यकता के लिए क्या अपरिहार्य है ?   1

2 निम्नलिखित काव्यांश को पढ़कर पूछे गए प्रश्नों के उत्तर लिखिए ।

यह समर तो और भी अपवाद है

चाहता कोई नहीं इसको , मगर

जूझना पड़ता सभी को , शत्रु जब

आ गया हो द्वार पर ललकारता ।

छीनता हो स्वत्व कोई , और तू

त्याग - ताप से काम ले , यह पाप है ।

पुण्य है विच्छिन्न कर देना उसे

बढ़ रहा तेरी तरफ जो हाथ हो ।

युद्ध को तुम निंद्य कहते हो मगर

जब तलक हैं उठ रही चिनगारियां

भिन्न स्वार्थों के कुलिश संघर्ष की ,

युद्ध तब तक विश्व मे अनिवार्य है ।

और जो अनिवार्य है ,उसके लिए

खिन्न या परितप्त होना व्यर्थ है ।

तू नहीं लड़ता ,न लड़ता ,आग यह

फूटती निश्चय किसी व्याज   से ।

(क) कवि ने किसे पाप कहा है ?   1

(ख) युद्ध कब तक जारी रहेगा ?   1

(ग) युद्धके लिए पछतावा न करने की बात क्यों कही गयी है ?   1

(घ)किस चीज को   कोई नहीं चाहता ?   1

(ङ) युद्ध कब आवश्यक हो जाता है ?   1

(च) पुण्य किसे कहा गया है ?   1

अथवा

हाय , वे साथी कि चुंबक -लोह -से   जो पास आए ,

पास क्या आए ,हृदय के बीच ही गोया समाए,

दिन कटे ऐसे कि कोई तार वीणा के मिलाकर

एक मीठा और प्यारा जिंदगी का गीत गाए ,

वे गए तो सोचकर वह लौटने वाले नहीं वे ,

खोज   मन का मीत कोई लौ लगाना कब मना है

है अंधेरी रात पर दीवा जलाना कब माना है ?

(क) कवि के साथी कैसे थे ?

(ख) साथियों के साथ कवि के दिन किस प्रकार कटे ?

(ग)   आज वे साथी कहां है   ?

(घ) साथी की मृत्यु पर कवि क्या प्रेरणा देता है ?

(ङ) अंधेरी रात में दीवा का यहां क्या आशय है ?

(च) इसका शीर्षक लिखिए ।

खण्ड -ख

3 निम्नलिखित में से किसी एक का दृश्य लेखन कीजिए :   5

(क) पुस्तक मेला   (ख) बाढ़ का आंखों देखा वर्णन (ग)   विद्यालय में आयोजित विज्ञान परियोजना प्रदर्शनी का वर्णन

4 अपने प्रधानाचार्य को एक प्रार्थना - पत्र लिखिए , जिसमें कई महीने से अंग्रेजी की पढ़ाई न होने के कारण उत्पन्न कठिनाई का वर्णन किया गया हो ।   5

अथवा

शिक्षा निदेशालय में कार्यालय सहायक के लिए एक आवेदन पत्र लिखिए ।

5 अपने विद्यालय के वार्षिकोत्सव पर एक प्रतिवेदन तैयार कीजिए ।   3

अथवा

अखिल भारतीय साहित्य एवं संस्कृति संस्थान ,महानिदेशालय द्वारा मोबाइल फोन पर होने वाले व्यय के लिए निर्धारित सीमा तय करते हुए एक परिपत्र (सर्कुलर) लिखिए ।

6 निम्नलिखित प्रश्नों के संक्षिप्त उत्तर लिखिए -

(क) पत्रकारिता से आप क्या समझते हैं ?   1

(ख) पत्रकारिता के प्रमुख आयाम कौन -कौन से हैं ?   1

(ग) वाचडाग पत्रकारिता से आप क्या समझते हैं ?   1

(घ) पेज- श्री पत्रकारिता किसे कहते हैं ?   1

7 राजभाषा विभाग ,भारत सरकार ने सभी केंद्रीय विद्यालयों मे हिन्दी पखवाडा मनाने के लिए एक आदेश जारी किया है । इस विषय को लेकर एक प्रेस विज्ञप्ति लिखिए ।   3

अथवा

शिक्षा विभाग ,राजस्थान प्राथमिक शिक्षकों की बहाली करना चाहता है । इस विषय को लेकर एक प्रेस विज्ञप्ति लिखिए ।

खण्ड - ग

8 निम्नलिखित पदयांश को पढ़कर पूछे गए प्रश्नों के उत्तर लिखिए -   2+2+2=6 पग घुंघरू बांधि मीरां नाची ,

मैं तो मेरे नारायण सूं आपही हो गई साची

लोग कहै , मीरां भइ बावरी ; न्यात कहाई कुल -नासी

विस का प्याला राणा भेज्या , पीवत मीरां हांसी

मीरां के प्रभु गिरिधर नागर , सहज मिले अविनासी

(क) कृष्ण भक्ति का मीरा पर क्या प्रभाव पड़ा ?

(ख)" मैं तो मेरे नारायण सूं , आपहि हो गई साची " पंक्ति के माध्यम से कवयित्री क्या कहना चाहती है ?

(ग) कृष्ण के प्रति प्रेम के कारण मीरा को क्या- क्या अत्याचार सहने पड़े ?

अथवा

लहराते वे खेत द्गों में

हुआ बेदखल वह अब जिनसे ,

हंसती थी उसके जीवन की

हरियाली जिनके तृन -तृन से !

आंखों ही में घूमा करता

वह उसकी आंखों का तारा ,

कारकुनों की लाठी से जो

गया जवानी ही में मारा !

(क) किसान को कहां से बेदखल कर दिया गया था ?

(ख) काव्यांश के आधार पर किसान के जीवन में खेतों का क्या स्थान है ?

(ग) कारकुनों ने किसका वध किया और क्यों ?

9 भाव सौंदर्य व शिल्प सौंदर्य स्पष्ट कीजिए ।   3=3=6

अंसुवन जल सींचि -सींचि ,प्रेमि बेलि बोयी ।

अब त बेली फैलि गयी ,आणंद फल होयी । ।

10 निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर लिखिए -   2+2=4

(क) कबीर ने ऐसा क्यों कहा है कि संसार बौरा गया है ?

(ख) कविता में किसान की पीड़ा के लिए किन्हे ज़िम्मेदार बताया गया है ?

(ग) मायके आई बहन के लिए कवि ने घर को परिताप का घर क्यों कहा है ?

11 निम्नलिखित गद्यांश को पढ़कर पूछे गए प्रश्नों के उत्तर दीजिए ।

 पूछना यह था कि किस्म - किस्म की रोटी पकाने का इल्म आपने कहां से हासिल किया ? मियां नसीरुद्दीन ने आंखों के कंचे हम पर फेर दिए । फिर तरेर कर बोले - "क्या मतलब ? पूछिए साहब - नानबाई इल्म लेने कहीं और जाएगा ? क्या नगीनासाज़ के पास ? क्या आईनासाज़ के पास ? क्या मीनासाज़ के पास ? या रफ़ूगर ,रंगरेज या तेली -तंबोली से सीखने जाएगा ? क्या फरमा दिया साहब -यह तो हमारा खानदानी पेशा ठहरा । हां इल्म की बात पूछिए तो जो कुछ भी सीखा ,अपने वालिद उस्ताद से ही मतलब यह कि हम इस घर से न निकले कि कोई पेशा अख़्तियार कारेंगे । जो बाप दादा का हुनर था वही उनसे पाया और वालिद मरहूम के उठ जाने पर आ बैठे उन्हीं के ठीये पर । "

(क) मियां नसीरुद्दीन ने लेखिका को आंखें तरेर कर क्यों उत्तर दिया ?   2

(ख) मियां ने किन - किन खानदानी व्यवसायों का उदाहरण दिया और क्यों ?   2

(ग) मियां ने अपनी आजीविका चलाने के लिए कौन -कौन -सा काम किया और क्यों ?   2

(घ) मियां नसीरुद्दीन से लेखिका ने क्या प्रश्न किया ?   1

12 निम्नलिखित प्रश्नों मे से किसी तीन प्रश्नों के उत्तर लिखिए ।   3+3+3=9

(क) कहानी के अंत में अलोपीदीन के वंशीधर के नियुक्त करने के पीछे क्या कारण हो सकते हैं ? तर्क सहित उत्तर दीजिए ।

(ख) मियां नसीरुद्दीन को नानबाइयों का मसीहा क्यों कहा गया है ?

(ग) कर्ज़न को इस्तीफा क्यों देना पड़ा ? (विदाई संभाषण पाठ के आधार पर लिखिए)

(घ) धनराम को मोहन के किस व्यवहार पर आश्चर्य होता है और क्यों ? (गलता लोहा पाठ के आधार पर लिखिए)

13 संगीत जीवन में किस प्रकार लाभकारी होता है ? (भारतीय गायिकाओं में बेजोड़ पाठ के आधार पर उत्तर दीजिए)

                         अथवा   4

'राजस्थान की रजत बूंदे' पाठ में किस समस्या की ओर संकेत किया गया है । यह पाठ आपको क्या संदेश देता है ?

14 निम्नलिखित प्रश्नों में से किन्ही दो प्रश्नों के उत्तर लिखिए ।   4+4=8

(क) लेखक ने लता की गायकी की किन विशेषताओं को उजागर किया है ? आपको लता की गायकी में कौन -सी विशेषताएं नजर आती हैं ? स्पष्ट कीजिए ।

(ख) लता ने करूण रस के गाने के साथ न्याय नहीं किया है , जबकि शृंगारपरक गाने वे बड़ी उत्कृष्टता से गाती है इस कथन से आप कहां तक सहमत हैं ?

(ग) कुंई ,कुआं से किस प्रकार भिन्न होती है तथा कुंई कहां -कहां पाई जाती है ? (राजस्थान की रजत बूंदे)

(घ) चेलवांजी कुंई के भीतर किस प्रकार कार्य करते हैं ?राजस्थान की रजत बूंदें पाठ के आधार पर स्पष्ट कीजिए ।

Section A

1. (b)
   the uncertainty in the length is 0.01

   Explanation:
   Suppose, you are simply told that an object has a measured length with no indication of its precision as in the question. In this case, all you have to go on is the number of digits contained in the data. Thus the quantity "0.42 cm" is specified to 0.01. So the uncertainty in the length is 0.01.

2. As per ncrt

3. (d) Decrease
   Explanation:
   if a ball is thrown upward at an angle? The ball has a vertical and a horizontal component of velocity. The force of gravity is acting on it and its acceleration is in the downward direction. The vertical component of velocity is therefore changing. As the motion and acceleration is in opposite direction so vertical component of velocity decrease.

4. (a)
   a vector equal in magnitude to the product of mass and instantaneous velocity and direction being that of instantaneous velocity

   Explanation:
   $\vec{p} = m\vec{v}$

5. S.I unit of luminous intensity is candela (cd) and of temperature is Kelvin(K).

6. $[ML^{-2}T^{-2}]$

7. We know that one parsec is equal to 3.084×10^{16} m of distance,

   $\therefore \quad 1m = \frac{1}{3.084 \times 10^{16}}$ parsec

   $= 3.25 \times 10^{-17}$ parsec

<div align="center">OR</div>

   i. $3.0m/s^2 = \frac{3 \times 10^{-3}}{\left(\frac{1}{3600}h\right)^2}$ km/hr^2

   $= 3.9 \times 10^4$ km/hr^2

   ii. $6.67 \ 10^{-11}Nm^2/kg^2 = g^{-1}cm^3s^{-2}$

   $= 6.67 \times 10^{-11} kg^{-1} m^3 s^{-2}$

   $= 6.67 \times 10^{-11} \times 10^3 \times \left(10^2\right)^3$

   $= 6.67 \times 10^{-8} g^{-1} cm^3 s^{-2}$

8. $[a] = [F] = [N] = [MLT^{-2}]$ and $[b] = \left[\frac{F}{x}\right] = \left[\frac{N}{m}\right] = \left[\frac{MLT^{-2}}{L}\right] = \left[MT^{-2}\right]$

9. (d)
   is equal in equal intervals of time.

   Explanation:
   Uniform motion is the kind of motion in which a body covers equal displacement in equal intervals of time. It does not matter how small the time intervals are, as long as the displacements covered are equal. If a body is involved in rectilinear motion and the motion is uniform, then the acceleration of the body must be zero.

10. As per ncert

11. The magnitude of the relative velocity will remain same, i.e., no effect on its magnitude.

12. No, speed of an object can never be negative because distance is also always positive.

OR

In that situation the slope of the x-t graph will be zero, therefore the velocity of the particle is zero.

13. (b)

$$\sqrt{A_x^2 + A_y^2 + A_z^2}$$

Explanation:

Rectangular component of a Vector: The projections of vector a along the x, y, and z directions are A_x, A_y, and A_z, respectively.
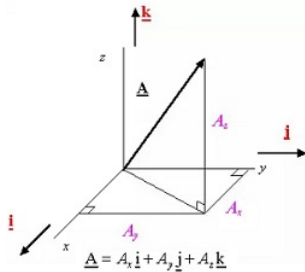
Magnitude of vector = $\sqrt{A_x^2 + A_y^2 + A_z^2}$

14. (a)

distributive laws

Explanation:

If a vector is multiplied by a scalar as in $p\vec{A}$, then the magnitude of the resulting vector is equal to the product of p and the magnitude of $\vec{A}$, and its direction is the same as $\vec{A}$ if p is positive and opposite to $\vec{A}$ if p is negative.

Distributive law for scalar multiplication:

$$p(\vec{A} + \vec{B}) = p\vec{A} + p\vec{B}$$

15. A body moving in a circular path.

16. $\hat{n} = \dfrac{\vec{A} \times \vec{B}}{|\vec{A} \times \vec{B}|}$

OR

We know that the time of flight is given by the equation, $T_1 = \dfrac{2u\sin\theta}{g}$ for angle of projection θ

and $T_2 = \dfrac{2u\sin\left(\frac{\pi}{2} - \theta\right)}{g} = \dfrac{2u\cos\theta}{g}$ for angle of projection (90 - θ)

$\therefore \dfrac{T_1}{T_2} = \dfrac{\sin\theta}{\cos\theta} = \tan\theta$

17. Yes it can be at rest, only if the external forces acting on the body can be represented in magnitude and direction by the sides of a closed polygon taken in the same order. OR in simple words if the vector sum of all the forces acting on a body is zero.

18. Reaction force or apparent weight of the bottle, R = m(g - a) = 0, as the bottle as well as the water bubbles including water falls freely i.e. a = g. That's why bubbles will not rise in water because water in freely falling bottle is in the state of weight lessness. Hence, no upthrust force acts on the bubbles.

19. This happens solely due to inertia of motion. When the speeding bus stops suddenly, lower part of the body in contact with the seat comes to rest at the very moment. But the upper part of the body of the passengers tends to maintain its uniform motion according to the inertia of motion. Hence the passengers are thrown forward.

20. A swimmer pushes the water backwards to create a force as an action on water. According to Newton's third law of motion he gets an equal and opposite reaction of water for which he is able to swim in the forward direction.

OR

Inertia and linear momentum is measured by mass of the body and is a vector quantity and mass is a scalar quantity.

Section B

21. Here, displacement S = 200 m, error in displacement ΔS =0.5 m, time t = 20 s, error in time Δt =0.2 s

    As, Velocity = $v = \frac{S}{t}$

    The formula of percentage error in velocity is as under

    $\frac{\Delta v}{v} \times 100 = \left[\frac{\Delta S}{S} + \frac{\Delta t}{t} \right] \times 100\%$

    $= \left[\frac{0.5}{200} + \frac{0.2}{20} \right] \times 100$

    = 1.25%

<div align="center">OR</div>

Mass of grocer's box = 2.300 kg

Mass of gold piece I = 20.15g = 0.02015 kg

Mass of gold piece II = 20.17 g = 0.02017 kg

   a. Total mass of the box = 2.3 + 0.02015 + 0.02017 = 2.34032 kg

   In addition, the final result should retain as many decimal places as there are in the number with the least decimal places. Hence, the total mass of the box is 2.3 kg.

   b. Difference in masses = 20.17 - 20.15 = 0.02 g

   In subtraction, the final result should retain as many decimal places as there are in the number with the least decimal places.

22.   i. It is a vector quantity having both magnitude and direction.

   ii. Displacement of a given body can be positive, negative or zero.

23. Graph is parabolic in shape.

24. Radius of the loop, r= 1 km = 1000 m

    Speed of the aircraft, v= 900 km/h $= 900 \times \frac{5}{18} = 250 \text{m/s}$

    Centripetal acceleration, $a_e = \frac{v^2}{r}$

    $= \frac{(250)^2}{1000} = 62.5 \text{m/s}^2$

    Acceleration due to gravity, g = 9.8 m/s^2

    $\frac{a_c}{g} = \frac{62.5}{9.8} = 6.38$

    a$_c$ = 6.38 g

25. A stone cannot be considered as a projectile because a projectile must have two perpendicular components of velocities but in this case a stone has velocity in one direction while going up or coming downwards.

<div align="center">OR</div>

Equating,

$\frac{u^2 \sin 2\theta}{g} = \frac{u^2 \sin^2 \theta}{2g}$

$\because \frac{u^2 \sin 2\theta}{g} = R \text{(Horizontal Range)}$

$\sin 2\theta = 1/2 \sin^2 \theta$

$\because \frac{u^2 \sin^2 \theta}{2g} = h_m \text{ (Maximum Height)}$

$2 \sin \theta \cos \theta = 1/2 \sin^2 \theta$

$\tan \theta = 4 \Rightarrow \theta = 75.96°$

26. When a curved road is unbanked force of friction between the tyres and the road provides the necessary centripetal force. Friction has to be increased which will cause wear and tear. But when the curved road is banked, a component of normal reaction of the ground provides the necessary centripetal force which reduces the wear and tear of the tyres.

27.   i. Net downward force i.e. (the weight of the rain drop - the buoyancy offered by air on the drop) is balanced with the upward resistive force i.e. the viscous force offered by the air on the drop. Hence the drop falls

with its constant terminal velocity. Now, according to first law of motion F = 0 as a = 0 (particle moves with constant speed)

ii. Since kite is stationary, net force on the kite is also zero. In this case the upward force acting on the kite is balanced by the tension in the string.

Section C

28. Suppose wavelength λ associated with a moving particle depends upon (i) its mass (m), (ii) its velocity (v) and (iii) Planck's constant (h), then

$$\lambda = km^a v^b h^c \quad ..(1)$$

where, k is a dimensionless constant.

Representing the above equation in terms of its dimensions, we get

$[M^0 L^1 T^0] = [M]^a [LT^{-1}]^b [ML^2 T^{-1}]^c$

$\Rightarrow [M^0 L^1 T^0] = M^{a+c} L^{b+2c} T^{-b-c} \quad ..(2)$

Comparing power of M, L and T on both sides of equation (2), we get

a + c = 0, b + 2c = 1, - b - c = 0

we get a = -1, b = -1, c = + 1

putting the value of a,b, and c in equation (1), we get

$\lambda = km^{-1} v^{-1} h^1$

$\lambda = \frac{kh}{mv}$

Hence, the relation becomes $\lambda = \frac{kh}{mv}$ and it gives the de broglie wavelength of a moving particle.

29. We know

i. $a = \frac{dv}{dt}$

a dt = dv

Integrating

$$\int\limits_0^t a\,dt = \int\limits_u^v dv$$

at = v - u

v = u+at

ii. We know

$a = \frac{dv}{dt}$

Multiply and Divide by dx

$a = \frac{dv}{dt} \times \frac{dx}{dx}$

$a = \frac{dv}{dx} \times v$

$a\,dx = v\,dv \left(\because \frac{dx}{dt} = v \right)$

iii. Integrating within the limits

$$a\int\limits_0^s dx = \int\limits_u^v v\,dv$$

$as = \frac{v^2}{2} - \frac{\nu^2}{2}$

$as = \frac{v^2 - \nu^2}{2}$

$v^2 - \nu^2 = 2as$

30. In this question, we will use the equation of the straight line graph (linear equation).

y = mx + c.

In this equation, m is the slope of the graph and c is the interception on the y-axis.

Now according to the problem, initial velocity $= v_0$

Let the distance traveled in time $t = x_0$.

For the graph $\tan\theta = \frac{v_0}{x_0} = \frac{v_0 - v}{x}$ ....(i)
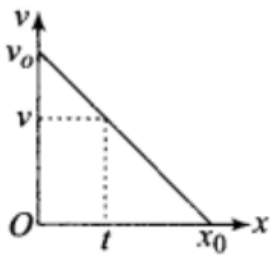
Where, v is velocity and x is displacement at any instant of time t.

From Equation (i), we have

$$v_0 - v = \frac{v_0}{x_0}x$$

$$\Rightarrow \quad v = \frac{-v_0}{x_0}x + v_0$$

We know that,

Acceleration, $a = \frac{dv}{dt} = \frac{-v_0}{x_0}\frac{dx}{dt} + 0$

$$\Rightarrow \quad a = \frac{-v_0}{x_0}(v)$$

$$= \frac{-v_0}{x_0}\left(\frac{-v_0}{x_0}x + v_0\right) = \frac{v_0^2}{x_0^2}x - \frac{v_0^2}{x_0}$$

Graph of a versus x is given below.
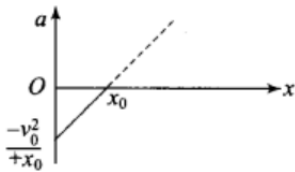
OR

Case I : When the lift was stationary,

t = time to each maximum height

u = 49 m/s , v = 0 at maximum height.

Since upward motion, therefore a = - 9.8 ms^{-2}

v = u + at

$$t = \frac{v-u}{a}$$

$$= \frac{-49}{-9.8} = 5s$$

Hence, the total time of flight = 2t = 2×5 = 10 s.

Case II : The lift was moving up with a uniform velocity of 5 m/s. In this case, the relative velocity of the ball with respect to the boy remains the same i.e., 49 m/s. Therefore, in this case also, the ball will return back to the boy's hand after 10 s.

31. As per ncrt

OR

As per ncert

32. The described situation is shown in the given figure.
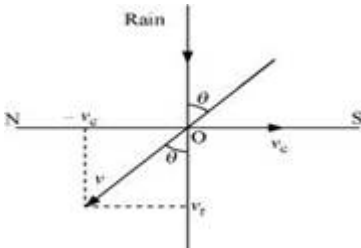
Here,

v$_c$ = Velocity of the cyclist

v$_r$ = Velocity of falling rain

In order to protect herself from the rain, the woman must hold her umbrella in the direction of the relative velocity (v) of the rain with respect to the woman.

v = v$_t$ + (-v$_c$)

= 30 + (-10) = 20 m/s

$\tan\theta = \frac{v_c}{v_r} = \frac{10}{30}$

$\theta = \tan^{-1}(0.333) \approx 18°$

Hence, the woman must hold the umbrella toward the south, at an angle of nearly 18° with the vertical.

So these problems can be solved using relative velocity concept which requires conversion of non inertial frame into inertial frame.

33. The principle of conservation of linear momentum states that,"If no external forces act on the system of two colliding objects, then the vector sum of the linear momentum of each body remains constant and is not affected by their mutual interaction." i.e. if $\overline{F}ext = 0$ then $\overline{P} = $ constant . To prove this principle, we consider a collision between two spheres **A** and **B** having masses of **m₁** and **m₂** respectively.Let **u₁** and **u₂** be the velocities of the spheres before collision such that **u₁** > **u₂** and moving on the same straight line . After collision, let their velocities be **v₁** and **v₂** on the same line. If they collide with each other for a short time interval **t**, each sphere exerts a force on the other sphere and so, the force experienced by **A** is given as

$F_2 = \frac{change\ in\ momentum}{time} = \frac{m_1 v_1 - m_1 u_1}{t}$

Similarly, force experienced by **B** is $F_1 = \frac{change\ in\ momentum}{time} = \frac{m_2 v_2 - m_2 u_2}{t}$

According to Newton's third law of motion, the force experienced by **A** and **B** are equal and opposite,

$\overrightarrow{F_2} = -\overrightarrow{F_1}$

$\Rightarrow m_2 v_2 - m_2 u_2 = -(m_1 v_1 - m_1 u_1)$

$\Rightarrow m_2 v_2 + m_1 v_1 = m_1 u_1 + m_2 u_2$

$\Rightarrow P_f = P_i$

That is, total momentum before collision is equal to total momentum after collision if no external forces act on them which proves the principle of conservation of linear momentum.

Section D

34. as per ncert book

OR

statement : if two vectors are represented in the form of two consecutive sides of triangle then third side will be their vector sum in opposite order.

derivation : as per ncert book

35. as per ncert

OR

The initial velocity of ball is given as: u = 100 ms⁻¹ and the acceleration due to gravity (g) = -10m/s² (negative sign is because of it being acting in downward direction)

At highest point, v = 0

As we know that, v = u + at

$\Rightarrow 0 = 100 - 10 \times t$

Time taken to reach highest point is given by:

$t = \frac{100}{10} = 10$s

The ball will return to the ground at t = 20 s.

Velocities of the ball at different instants of time will be as follows.

At t = 0, v = 100 - 10×0 = 100 m/s

At t = 5, v = 100 - 10×5 = 50 m/s

At t = 10, v = 100 - 10×10 = 0 m/s

At t = 15, v = 100 - 10×15 = -50 m/s

At t = 20, v = 100 - 10×20 = -100 m/s

The velocity time - graph will be as shown in the figure.
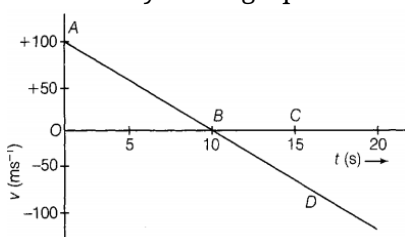
i. Maximum height attained by the ball

= Area of triangle AOB

= $\frac{1}{2} \times 10s \times 100$ ms^{-1} = 500 m

ii. Height attained after 15 seconds

= Area of triangle AOB + Area of triangle BCD

$= 500 + \frac{1}{2}(15 - 10) \times (-50)$(Velocity after 10 seconds is taken as negative because the ball is now coming downwards)

= 500 - 125 = 375 m

36. 1. At the circular turn outer edge of the road is raised above the inner edge is called as banking of the road. And the formed angle is called as angle of banking.

OR

as per ncert

Solution
Class 11 - Mathematics
Half Yearly Examination (2019-20)
Section A

1. (a)
   A ∩ B'

   Explanation:
   $A = \{0, 3, 9, 12, 15, 18, 21, \ldots\}$
   $B = \{0, 5, 10, 15, 20, 25, 30, \ldots\}$
   $B' = \{1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 13, 14, 16, 17, 18, 19, 21, \ldots\}$
   $A - B = \{3, 9, 12, 18, 21, \ldots\}$
   $A \cap B' = \{3, 9, 12, 18, 21, \ldots\}$
   $\therefore A - B = A \cap B'$

2. (d)
   {x: x ≠ x }

   Explanation:
   (x: x ≠ x). x is not equal to x is null set as it refers to there is no element in the set.And it also representing the set builder form pattern

3. (d)
   { 1, 2 , 3 , 4 }

   Explanation:
   $Given\, A = \{1, 2, 3\}, B = \{3, 4\}\ and\ C = \{4, 5, 6\}$
   $B \cap C = \{4\}$
   $A \cup (B \cap C) = \{1, 2, 3, 4\}$

4. (a)
   two points

   Explanation:
   From A, $x^2 + y^2 = 5$ and from B, $2x = 5y$
   Now, $2x = 5y \Rightarrow x = \frac{5}{2y}$
   $\therefore x^2 + y^2 = 5 \Rightarrow \left(\frac{5}{2y}\right)^2 + y^2 = 5$
   $\Rightarrow 29y^2 = 20 \Rightarrow y = \pm\sqrt{\frac{20}{29}}$
   $\therefore x = \frac{5}{2}\left(\pm\sqrt{\frac{20}{29}}\right)$
   $\therefore$ Possible ordered pairs = four
   But two ordered pair in which c is positive and y is negative will be rejected as it will not be satisifed by the equation in B. Therefore,
   $A \cap B$ contain 2 elements.

5. (d)
   $A \times (B \cup C)$

   Explanation:
   $A \times (B \cup C) = (A \times B) \cup A \times C$
   $= \{a, b\} \times \{c, d\} \cup \{a, b\} \times \{d, c\}$
   $= \{(a, c), (a, d), (b, c), (b, d)\} \cup \{(a, d), (a, c), (b, d), (b, c)\}$

$$= \{(a,c),(a,d),(a,c),(b,c),(b,d),(b,e)\}$$

6. (c)

[1, 6]

Explanation:

For f(x) to be real, we must have,

$x - 1 \geqslant 0 \ and \ 6 - x \geqslant 0$

$\Rightarrow \ x \geqslant \varphi \ and \ x - 6 \ \leqslant 6$

$\therefore \ Domain \ = [1,6]$

7. (b)

$\frac{n\pi}{3} + \frac{\pi}{12}$

Explanation:

$\tan 3x = 1$

$\Rightarrow tan\,(3x) = tan\left(\frac{\pi}{4}\right)$

$\Rightarrow 3x = n\pi + \frac{\pi}{4}, n\epsilon Z$

$\Rightarrow x = \frac{n\pi}{3} + \frac{\pi}{12}, n\epsilon Z$

8. (d)

1

Explanation:

Since tan 1 .tan 89 =1...... only tan 45 in the middle which has the value 1. hence the product is 1.

9. (b)

- 1

Explanation:

$sin\,(180 + \phi)\,(180 - \phi)\,cosec^2\phi = -sin\phi.\,sin\phi cosec^2\phi = -sin^2\phi cosec^2\phi = -1$

OR

(a)

$\frac{\pi}{6}$

Explanation:

$tan\theta + \sec\theta = \sqrt{3}$

$\Rightarrow sec^2 x = \left[\sqrt{3} - tan\theta\right]^2$

$\Rightarrow \left(1 + tan^2 x\right) = 3 + tan^2 x - 2\sqrt{3}tanx$

$\Rightarrow 2\sqrt{3}tanx = 2$

$tanx = \frac{1}{\sqrt{3}}$

$\Rightarrow tan \quad x = tan\left(\frac{\pi}{6}\right)$

$\Rightarrow x = n\pi + \left(\frac{\pi}{6}\right), n\epsilon Z$

$\Rightarrow x = \frac{\pi}{6}, 0 < \theta < \ \pi$

10. (d)

a + b

Explanation:

When n = 1 we have a + b.And the subsequent substitution of n as 2,3,... will result in the expression whose factor is a + b.

11. (c)

64

Explanation:

When n = 1 we get 64. When n = 2 we get 704 which is divisible by 64......... By the principle of mathematical induction it is divisible by 64.

12. (d)

4

Explanation:

$\frac{1+i}{1-i} = \frac{1+i}{1-i} \cdot \frac{1+i}{1+i} = \frac{(1+i)^2}{1+1} = \frac{1-1+2i}{1+1} = \frac{2i}{2} = i$

$\therefore \left(\frac{1+i}{1-i}\right)^n = i^n$

$We \quad have \quad i^4 = 1 \quad which \quad is \quad positive$

$Hence \quad the \quad least \quad value \quad of \quad n \quad is \quad 4$

13. (b)

-i

Explanation:

Given $z = \frac{\sqrt{3}+i}{2}$

$iz = i\left[\frac{\sqrt{3}+i}{2}\right] = \frac{-1+i\sqrt{3}}{2} = \omega$

$\Rightarrow z = \frac{\omega}{i}$

Then $z^{69} \quad = \left[\frac{\omega}{i}\right]^{69} = \frac{(\omega^3)^{23}}{(i^2)^{34} \cdot i} = \frac{1}{(-1)^{34} \cdot i} = \frac{1}{i} = -i \; \left[\because \omega^3 = 1, i^2 = -1\right]$

14. (c)

z is purely real

Explanation:

Let $Z = x + iy$

Now $z = \bar{z} \Rightarrow x + iy = x - iy \Rightarrow 2iy = 0 \Rightarrow y = 0$

Which means z is purely real

15. (d)

1st quadrant

Explanation:

The solution region of x $\geq$ 0 will be the half of XY –plane which lies on the right of y – axis , including the points on y – axis [First and Fourth quadrants]

The solution region of y $\geq$ 0 will be the half of XY –plane which lies above x – axis , including the points on x – axis [First and Second quadrants]

Hence the solution region of x $\geq$ 0 , y $\geq$ 0 will be the the intersection of the above two regions ,which is the first quadrant.

16. (b)

ac $<$ bc

Explanation:

The sign of the inequality is to be reversed $(< \quad to \quad > \quad or \quad > \quad to \quad <)$ if both sides of an inequality are multiplied by the same negative real number.

17. (a)

$2 < $ x $ < 6$

Explanation:

x − 2 > 0

$\Rightarrow x > 2$

$\Rightarrow x \epsilon (2, \infty)$

Now 3x < 18

$\Rightarrow x < 6$

$\Rightarrow x \epsilon (-\infty, 6)$

So solution set is $(2, \infty) \bigcap (-\infty, 6) = (2, 6)$

$\Rightarrow 2 < x < 6$

<div align="center">OR</div>

(b)

ac ≤ bc

Explanation:

The inequality remains same if both sides of an inequality are multiplied by the same positive real number and inequality will become an equation if we multiply it by 0.

18. (c)

r = 0 or 1

Explanation:

Given P(n,r) = C(n,r)

$\Rightarrow \frac{n!}{(n-r)!} = \frac{n!}{r!(n-r)!}$

$\Rightarrow 1 = \frac{1}{r!}$

$\Rightarrow r! = 1$

$\Rightarrow r = 0 \quad or \quad r = 1 \left[\because \quad 0! = 1 \quad , \quad 1! = 1 \right]$

19. (c)

6840

Explanation:

for first place we have 20 students, for second we have 19 and for the third we have 18

$^{20}P_3 = 20*19*18$

20. 210

<div align="center">OR</div>

permutation

<div align="center">**Section B**</div>

21. Here A = {x : x is a natural number} = {1, 2, 3, 4, 5, . . .}

B = { x : x is an even natural number} = {2, 4, 6, . . . }

C = {x : x is an odd natural number} = {1, 3, 5, 7, . . .}

and D = {x : x is a prime nmber} = {2, 3, 5, 7. . . . }

$A \cap D$= {x : x is a natural number) $\cap${x : x is a prime number}

= {x : x is a prime number}

= D

22. The statement is true.

Let $x \in A \Rightarrow x \in B \, (\because A \subset B)$ Now $x \notin B \Rightarrow x \notin A$

23. First, let A = B. Then, we have to prove that $A \times B = B \times A$

Now, A = B

$\Rightarrow \quad A \times B = A \times A$ and $B \times A = A \times A$

$\Rightarrow \quad A \times B = B \times A$

Conversely, let $A \times B = B \times A$. Then, we have to prove that A = B.

Let x be an arbitrary element of A. Then,

$x \in A$

$\Rightarrow \quad (x, b) \in A \times B$ for all b∈B.

$\Rightarrow \quad (x,b) \in B \times A$

$\Rightarrow \quad x \in B$

$\therefore \quad A \subseteq B$

Let y be an arbitrary element of A. Then,

$y \in B$

$\Rightarrow \quad (a,y) \in A \times B$ for all $a \in A$

$\Rightarrow \quad (a,y) \in B \times A$

$\Rightarrow \quad y \in A$

$\therefore \quad B \subseteq A$

Hence, A = B.

Hence, $A \times B = B \times A \Leftrightarrow A = B$

24. We have, $cos\,(\theta + \phi)$ = m cos $(\theta - \phi)$

$\Rightarrow \frac{1}{m} = \frac{\cos(\theta-\phi)}{\cos(\theta+\phi)}$

Applying componendo and dividendo rule, we get

$\frac{1-m}{1+m} = \frac{\cos(\theta-\phi)-\cos(\theta+\phi)}{\cos(\theta-\phi)+\cos(\theta+\phi)}$

$= \frac{(\cos\theta\cos\phi+\sin\theta\sin\phi)-(\cos\theta\cos\phi-\sin\theta\sin\phi)}{(\cos\theta\cos\phi+\sin\theta\sin\phi)+(\cos\theta\cos\phi-\sin\theta\sin\phi)}$

$[\because cos(A-B) = cosAcosB + sinAsinB$ and $cos(A+B) = cosAcosB - sinAsinB]$

$= \frac{2\sin(\theta)\sin(\phi)}{2\cos(\theta)\cos(\phi)}$

$= \tan\theta\tan\phi$

$\therefore \left(\frac{1-m}{1+m}\cot\phi\right) = \tan\theta \left[\because \frac{1}{\tan\phi} = \cot\phi\right]$

Hence proved.

<div align="center">OR</div>

We have L.H.S= $\cos^2 2x - \cos^2 6x$

$[\because \cos^2 B - \cos^2 A = \sin(A+B)\sin(A-B)]$

= sin 8 x sin 4x = R.H.S.

25. Using binomial theorem for the expansion of $(1 - 2x)^5$ we have

$(1 - 2x)^5 = {}^5C_0 + {}^5C_1(-2x) + {}^5C_2(-2x)^2 + {}^5C_3(-2x)^3 + {}^5C_4(-2x)^4 + {}^5C_5(-2x)^5$

= 1 + 5 (-2x) + 10(-2x)^2 + 10(-2x)^3 + 5(-2x)^4 + (-2x)^5

= 1 - 10x + 40x^2 - 80x^3 + 80x^4 - 32x^5

<div align="center">OR</div>

By using binomial theorem, we have

(a + b)^n = ^{n}C$_0$ a^n + ^{n}C$_1$ a^{n-1} b + ^{n}C$_2$ a^{n-2} b^2 + ... + ^{n}C$_r$ a^{n-r} b^r + ... + ^{n}C$_n$ b^n

$\therefore \left(x^2 + \frac{3}{x}\right)^4$ = ^{4}C$_0$ (x^2)^4 + ^{4}C$_1$ (x^2)$^{4-1}\left(\frac{3}{x}\right)^1$ + ^{4}C$_2$ (x^2)$^{4-2}\left(\frac{3}{x}\right)^2$ + ^{4}C$_3$(x^2)$^{4-3}\left(\frac{3}{x}\right)^3$ + 4C$_4$(x^2)$^{4-4}\left(\frac{3}{x}\right)^4$

= 1.x^8 + 4 (x^2)$^3\left(\frac{3}{x}\right)$ + 6 (x^2)$^2\left(\frac{3}{x}\right)^2$ + 4 (x^2)$\left(\frac{3}{x}\right)^3$ + 1. (x^2)$^0\left(\frac{3}{x}\right)^4$

$[\because {}^4C_0 = 1, {}^4C_1 = 4, {}^4C_2 = 6, {}^4C_3 = 4$ and ^{4}C$_4$ = 1]

$= x^8 + 4\cdot x^6\cdot\frac{3}{x} + 6x^4\cdot\frac{9}{x^2} + 4x^2\cdot\frac{27}{x^3} + 1\cdot 1\cdot\frac{81}{x^4}$

= x^8 + 12x^5 + 54x^2 + $\frac{108}{x}$ + $\frac{81}{x^4}$

26. We have, $\frac{3+2i\sin\theta}{1-2i\sin\theta} = \frac{3+2i\sin\theta}{1-2i\sin\theta} \times \frac{1+2i\sin\theta}{1+2i\sin\theta}$

[multiplying numerator and denominator by 1 + 2i sinθ]

$= \frac{3+6i\sin\theta+2i\sin\theta-4\sin^2\theta}{1-4(i)^2\sin^2\theta}$ $[\because$ (a - b) (a + b) = a^2 - b^2]

$= \frac{3-4\sin^2\theta+8i\sin\theta}{1+4\sin^2\theta}$

$= \frac{3-4\sin^2\theta}{1+4\sin^2\theta} + \frac{8i\sin\theta}{1+4\sin^2\theta}$

We are given the complex number to be real.

$\therefore \frac{8\sin\theta}{1+4\sin^2\theta}$ = 0

i.e., $\sin\theta = 0$

Thus, $\theta = n\pi, n \in Z$

27. Given, $|3x - 2| \leq \frac{1}{2}$

We know that, $|x| \leq a \Rightarrow -a \leq x \leq a$

$\therefore \quad |3x - 2| \leq \frac{1}{2} \Rightarrow \frac{-1}{2} \leq (3x - 2) \leq \frac{1}{2}$

$\Rightarrow \quad -\frac{1}{2} + 2 \leq 3x - 2 + 2 \leq \frac{1}{2} + 2$ [adding 2 on each term]

$\Rightarrow \quad \frac{3}{2} \leq 3x \leq \frac{5}{2}$

$\Rightarrow \quad \frac{3}{2} \times \frac{1}{3} \leq \frac{3x}{3} \leq \frac{5}{2} \times \frac{1}{3}$ [dividing each term by 3]

$\Rightarrow \quad \frac{1}{2} \leq x \leq \frac{5}{6}$ i.e., $x \in \left[\frac{1}{2}, \frac{5}{6}\right]$

28. Here the unit place can be filled by any one of the first 10 letters of the English alphabet. So the unit place can be filled in 10 ways. The tens place can be filled in 9 ways by remaining 9 letters of the English alphabet. The hundreds place can be filled in 8 ways by remaining 8 letters of the English alphabet.

The thousands place can be filled in 7 ways by the remaining 7 letters of the English alphabet.

$\therefore$ Total number of 4-letter code numbers $= 7 \times 8 \times 9 \times 10 = 5040$.

OR

LHS = n (n — 1) (n — 2)... (n — r +1)

$= \frac{n(n-1)(n-2)\ldots\{n-(r-1)\}}{1} \times \frac{(n-r)!}{(n-r)!}$

[multiplying numerator and denominator by (n - r)!]

$= \frac{n!}{(n-r)!}$ = RHS

Hence proved.

Section C

29. We know that $A = A \cap (A \cup B)$ and $A = A \cup (A \cap B)$

Now $A \cap B = A \cap C$ and $A \cup B = A \cup C$

$\therefore B = B \cup (B \cap A) = B \cup (A \cap B) = B \cup (A \cap C)[\because A \cap B = A \cap C]$

$= (B \cup A) \cap (B \cup C)$(By distributive law)

$= (A \cup C) \cap (B \cup C)$

$= (A \cup C) \cap (B \cup C)[\because A \cup B = A \cup C]$

$= (C \cup A) \cap (C \cup B)$

$= C \cup (A \cap B)$(by distributive law)

$= C \cup (A \cap C)[\because A \cap B = A \cap C]$

$= C \cup (C \cap A) = C$

Hence B = C.

OR

Here $A - (B - C) = A - (B \cap C)[\because A - B = A \cap B']$

$= A \cap (B \cap C')'$

$= A \cap (B' \cap C)[\because (A \cap B)' = A' \cup B']$

$= (A \cap B') \cup (A \cap C)$

$= (A - B') \cup (A \cap C)$

30. Suppose (a, b) be an arbitrary element of $(A \times B) \cap (C \times D)$.

$\Rightarrow (a, b) \in (A \times B) \cap (C \times D)$

$\Rightarrow \quad (a, b) \in A \times B$ and $(a, b) \in C \times D$

$\Rightarrow$ (a $\in A$ and $b \in B$) and (a $\in$ C and $b \in$ D)

$\Rightarrow$ (a $\in A$ and $a \in C$) and ($b \in B$ and $b \in D$)

$\Rightarrow \quad a \in (A \cap C)$ and $b \in (B \cap D)$

$\Rightarrow \quad (a, b) \in (A \cap C) \times (B \cap D)$

$\therefore \quad (A \times B) \cap (C \times D) \subseteq (A \cap C) \times (B \cap D)$ ..... (i)

Similarly, $(A \cap C) \times (B \cap D) \subseteq (A \times B) \cap (C \times D)$ ..... (ii)

From Equations (i) and (ii),

$(A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$

Hence proved.

OR

Here f(x) = ax + b

f = {(1, 1), (2, 3), (0, -1), (-1, -3)}

$\Rightarrow$ f (1) = 1, f (2) = 3, f(0) = -1, f(-1) = -3

Now f(1) = 1 $\Rightarrow a \times 1 + b = 1 \Rightarrow$ a+ b = 1 . . . (i)

$f(2) = 3 \Rightarrow a \times 2 + b = 3 \Rightarrow 2a + b = 3$ . . . (ii)

Subtracting (i) from (ii) we get

2a+b-(a+b)=3-1 $\Rightarrow$ a = 2

Putting a = 2 in (i)

2 + b = 1 $\Rightarrow$ b = -1

31. Given,

LHS = cos^2 x $+cos^2$ (x + $\frac{\pi}{3}$) $+cos^2$ (x - $\frac{\pi}{3}$) [$\because cos2x = 2cos^2 x - 1 \Rightarrow$ cos^2 x = $\frac{1+\cos 2x}{2}$]

= $\frac{1+\cos 2x}{2}$ + $\frac{1+\cos\left(2x+\frac{2\pi}{3}\right)}{2}$ + $\frac{1+\cos\left(2x-\frac{2\pi}{3}\right)}{2}$

= $\frac{1}{2}$ [$1 + cos2x + 1 + cos(2x+\frac{2\pi}{3}) +1 + cos(2x-\frac{2\pi}{3})$]

= $\frac{1}{2}$ [$3 + cos2x + cos(2x + \frac{2\pi}{3}) +cos(2x-\frac{2\pi}{3})$]

= $\frac{1}{2}$ [3 + cos 2x + 2 cos 2x cos $\frac{2\pi}{3}$] [$\because$ cos (x + y) + cos (x - y) = 2 cosx cosy]

= $\frac{1}{2}$ [3 + cos 2x + 2 cos 2x cos $(\pi - \frac{\pi}{3})$]

= $\frac{1}{2}$ [3 + cos 2x - 2 cos 2x cos $\frac{\pi}{3}$] [$\because$ using cos $(\pi - \theta)$ = - cos θ]

= $\frac{1}{2}$ [3 + cos 2x - 2 cos 2x $\times \frac{1}{2}$]

= $\frac{1}{2}$ [$3 + cos2x - cos2x$] = $\frac{3}{2}$

= RHS

$\therefore$ LHS = RHS

Hence proved.

32. **Step I:** Let P(n) be the given statement.

Then, $P(n) : 3^{2n+2} - 8n - 9$ is divisible by 8.

Step II: For n =1, we have

$P(1) : 3^{2+2} - 8.1 - 9 = 3^4 - 8 - 9$

$= 81 - 17 = 64$, which is divisible by 8.

Thus, P(1) is true.

Step III: For n = k, assume that P(k) is true.

Then, $P(k) : 3^{2k+2} - 8k - 9$ is divisible by 8.

$3^{2k+2} - 8k - 9 = 8m$, where m$\in$N.

$3^{2k+2} = 8m + 8k + 9$ ... (i)

Step IV: For n = k + 1, we have to show that P(k +1) is also true, i.e.,

$3^{2(k+1)+2} - 8(k + 1) - 9$ is divisible by 8.

Now, consider $P(k + 1) : 3^{2(k+1)} + 2 - 8(k + 1) - 9$

$= 3^{2k+2+2} - 8k - 8 - 9$

$= 3^2 . 3^{2k+2} - 8k - 17$

$= 9(8m + 8k + 9) - 8k - 17$ [from Eq. (i)]

$= 72m + 72k + 81 - 8k - 17$

$= 72m + 64k + 64$

$= 8[9m + 8k + 8]$

which is divisible by 8.

So, P(k + 1) is true whenever P(k) is true.

Hence, by Principle of Mathematical Induction, P(n) is true for all n $\in$ N.

33. Now $\left|\frac{\beta-\alpha}{1-\bar{\alpha}\beta}\right|^2 = \left[\frac{\beta-\alpha}{1-\bar{\alpha}\beta}\right]\left[\overline{\frac{\beta-\alpha}{1-\bar{\alpha}\beta}}\right]$ [$\because |z|^2 = z\bar{z}$]

$= \left[\frac{\beta-\alpha}{1-\bar{\alpha}\beta}\right]\left[\frac{\bar{\beta}-\bar{\alpha}}{1-\alpha\bar{\beta}}\right]$

$= \frac{\beta\bar{\beta}-\beta\bar{\alpha}-\alpha\bar{\beta}+\alpha\bar{\alpha}}{1-\bar{\alpha}\beta-\alpha\bar{\beta}+\alpha\bar{\alpha}\beta\bar{\beta}} = \frac{|\beta|^2-\alpha\bar{\beta}-\alpha\bar{\beta}+|\alpha|^2}{1-\bar{\alpha}\beta-\alpha\bar{\beta}+|\alpha|^2|\beta|^2}$

$$= \frac{1-\overline{\alpha}\beta-\alpha\overline{\beta}+|\alpha|^2}{1-\overline{\alpha}\beta-\overline{\alpha}\beta+|\alpha|^2} = 1$$

$$\therefore \left| \frac{\beta-\alpha}{1-\alpha\beta} \right| = 1$$

<div align="center">OR</div>

$(x + iy)^3 = u + iv$

$\Rightarrow x^3 + i^3y^3 + 3x^2yi + 3xy^2i^2 = u + iv$

$\Rightarrow (x^3 - 3xy^2) + (3x^2y - y^3)i = u + iv$

Comparing both sides

u = x $(x^2$ - 3y^2) and v = y(3x^2 - y^2)

Now $\frac{u}{x} + \frac{v}{y} = \frac{x(x^2-3y^2)}{x} + \frac{y(3x^2-y^2)}{y}$

= x^2 - 3y^2 + 3x^2 - y^2 = 4x^2 - 4y^2 = 4(x^2 - y^2)

34. Clearly, ALGEBRA has seven letters, where two A's, one L, one G, one E, one B, one R.

   i. Since, two A's are always together. We take both the A's as one letter.

      If p is the number of arrangements, then

      $p = 6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1$ = 720

   ii. Total number of arrangements of given word

      q $= \frac{7!}{2!} = \frac{7\times6\times5\times4\times3\times2!}{2!}$

      $= 7 \times 6 \times 5 \times 4 \times 3$ = 2520

      In these arrangements, some arrangements have two A's are together while in the rest they are not together.

      Hence, the number of arrangements in which two A's are not together is q - p = 2520 - 720 = 1800

35. $(x + 1)^6 + (x - 1)^6 == \left[{}^6C_0x^6+{}^6C_1x^5+{}^6C_2x^4+{}^6C_3x^3+{}^6C_4x^2+{}^6C_5x+{}^6C_6\right]$

   $+\left[{}^6C_0x^6+{}^6C_1x^5(-1)+{}^6C_2x^4(-1)^2+{}^6C_3x^3(-1)^3+{}^6C_4x^2(-1)^4+{}^6C_5x(-1)^5+{}^6C_6(-1)^6\right]$

   = [x^6 + 6x^5 + 15x^4 + 20x^3 + 15x^2 + 6x + 1] + [x^6 - 6x^5 + 15x^4 - 20x^3 + 15x^2 - 6x + 1]

   = 2x^6 + 30x^4 + 30x^2 + 2

   = 2(x^6 + 15x^4 + 15x^2 + 1)

   Putting $x = \sqrt{2}$

   $(\sqrt{2} + 1)^6 + (\sqrt{2} - 1)^6 = 2[(\sqrt{2})^6 + 15(\sqrt{2})^4 + 15(\sqrt{2})^2 + 1]$

   $= 2[8 + 15 \times 4 + 15 \times 2 + 1]$

   = 2 [8 + 60 + 30 + 1]

   $= 2 \times 99 = 198$

<div align="center">**Section D**</div>

36. Given, $a\,cos\theta + b\,sin\theta = c$ ...(i)

   $\Rightarrow b\,sin\theta = c - a\,cos\theta$

   On squaring both sides, we get

   $b^2sin^2\theta = c^2 + a^2cos^2\theta - 2ac\,cos\theta$

   $[\because (a + b)^2 = a^2 + b^2 + 2ab]$

   $\Rightarrow b^2(1 - cos^2\theta) = c^2 + a^2cos^2\theta - 2ac\,cos\theta$

   $[\because cos^2x + sin^2x = 1 \Rightarrow sin^2x = 1 - cos^2x]$

   $\Rightarrow (a^2 + b^2)cos^2\theta - 2ac\,cos\theta + c^2 - b^2 = 0$ ...(ii)

   It is a quadratic equation in $cos\theta$

   Since, α and β are the roots of Eq. (i).

   So, $cos\alpha$ and $cos\beta$ are the roots of Eq. (ii).

   $\therefore cos\alpha \times cos\beta = \frac{c^2-b^2}{a^2+b^2}$ ... (iii)

   $[\because$ product of roots in quadratic equation $= \frac{\text{constant term}}{\text{coefficient of square term}}]$

   On squaring Eq. (i), we get

   $a^2cos^2\theta + b^2sin^2\theta + 2ab\,sin\theta cos\theta = c^2$

   $\Rightarrow$ a^2 + b^2 tan$^2\theta$ + 2ab tanθ = c^2 sec$^2\theta$

   [dividing both sides by $cos^2\theta$]

$\Rightarrow a^2 + b^2 \tan^2\theta + 2ab \tan\theta = c^2 (1 + \tan^2\theta)$

$[\because \sec^2 x = 1 + \tan^2 x]$

$\Rightarrow (b^2 - c^2) \tan^2\theta + 2ab \tan\theta + a^2 - c^2 = 0 \dots$ (iv)

Since, $\tan\alpha$ and $\tan\beta$ are roots of Eq. (iv).

$\therefore \tan\alpha + \tan\beta = \frac{-2ab}{b^2-c^2}$

and $\tan\alpha \times \tan\beta = \frac{a^2-c^2}{b^2-c^2}$

$\Rightarrow \frac{\sin\alpha\cdot\sin\beta}{\cos\alpha\cdot\cos\beta} = \frac{a^2-c^2}{b^2-c^2}$

$\Rightarrow \sin\alpha \times \sin\beta = \frac{a^2-c^2}{b^2-c^2} \times \cos\alpha \times \cos\beta$

$= \frac{a^2-c^2}{b^2-c^2} \times \frac{c^2-b^2}{a^2+b^2}$ [using Eq. (iii)]

$= \frac{c^2-a^2}{a^2+b^2}$

We have, $\tan\alpha + \tan\beta = \frac{-2ab}{b^2-c^2}$

$\Rightarrow \frac{\sin\alpha}{\cos\alpha} + \frac{\sin\beta}{\cos\beta} = \frac{-2ab}{b^2-c^2}$

$\Rightarrow \frac{\sin\alpha\cdot\cos\beta+\sin\beta\cdot\cos\alpha}{\cos\alpha\cdot\cos\beta} = \frac{-2ab}{b^2-c^2}$

$\Rightarrow \sin(\alpha+\beta) = \frac{-2ab}{b^2-c^2} (\cos\alpha \times \cos\beta)$

$= \frac{-2ab}{b^2-c^2} \times \frac{c^2-b^2}{a^2+b^2}$ [using Eq. (iii)]

$\therefore \sin(\alpha+\beta) = \frac{2ab}{a^2+b^2}$

<div align="center">OR</div>

Given, $A + B + C = \pi$

$\Rightarrow A = \pi - (B + C) \dots$(i)

Now, $\frac{\cos A}{\sin B \cdot \sin C} = \frac{\cos[\pi-(B+C)]}{\sin B \cdot \sin C}$

$= \frac{-\cos(B+C)}{\sin B \cdot \sin C}$ $[\because \cos(\pi - \theta) = -\cos\theta]$

$= \frac{-[\cos B \cdot \cos C - \sin B \cdot \sin C]}{\sin B \cdot \sin C}$

$= -[\cot B \cot C - 1]$

$\therefore \frac{\cos A}{\sin B \cdot \sin C} = 1 - \cot B \times \cot C \dots$ (ii)

Similarly, $\frac{\cos B}{\sin C \cdot \sin A} = 1 - \cot A \times \cot C \dots$(iii)

and $\frac{\cos C}{\sin A \cdot \sin B} = 1 - \cot A \times \cot B \dots$(iv)

On adding Eqs. (ii), (iii) and (iv), we get

$\frac{\cos A}{\sin B \cdot \sin C} + \frac{\cos B}{\sin C \cdot \sin A} + \frac{\cos C}{\sin A \cdot \sin B}$

$= 3 - (\cot B \times \cot C + \cot A \times \cot C + \cot A \times \cot B) \dots$(v)

But $\cot(A + B) = \frac{\cot A \cdot \cot B - 1}{\cot B + \cot A}$

$\Rightarrow \cot(\pi - C) = \frac{\cot A \cdot \cot B - 1}{\cot B + \cot A}$

$[\because A + B + C = \pi]$

$[\therefore A + B = \pi - C]$

$\Rightarrow -\cot C = \frac{\cot A \cdot \cot B - 1}{\cot B + \cot A}$ $[\because \cot(\pi - \theta) = -\cot\theta]$

$\Rightarrow -\cot C [\cot B + \cot A] = \cot A \cot B - 1$

$\Rightarrow -(\cot B \cot C + \cot C \cot A) - \cot A \cot B = -1$

$\Rightarrow \cot B \times \cot C + \cot C \times \cot A + \cot A \times \cot B = 1 \dots$(vi)

On putting (vi) value in Eq. (v), we get,

$\frac{\cos A}{\sin B \cdot \sin C} + \frac{\cos B}{\sin C \cdot \sin A} + \frac{\cos C}{\sin A \cdot \sin B} = 3 - 1 = 2$

Hence proved.

37. We have,

12x + 12y $\leq$ 840, 3x + 6y $\leq$ 300, 8x + 4y $\leq$ 480, x $\geq$ 0, y $\geq$ 0

Converting the inequations into equations, we obtain,

12x + 12y = 840, 3x + 6y = 300, 8x + 4y = 480, x = 0 and y = 0

Region represented by 12x + 12y $\leq$ 840:

Putting x = 0 in 12x + 12y = 840, we get y = $\frac{840}{12}$ = 70

Putting y = 0 in 12x + 12y = 840, we get x = $\frac{840}{12}$ = 70

$\therefore$ The line 12x + 12y = 840, meets the coordinate axes at (0,70) and (70,0). Join these points by a thick line.

Now, putting x = 0 and y = 0 in 12x + 12y $\leq$ 840, we get 0 $\leq$ 840

Therefore, (0,0) satisfies the inequality 12x + 12y $\leq$ 840. So, the portion containing the origin represented the solution set of the inequation 12x + 12y $\leq$ 840

Region represented by 3x + 6y $\leq$ 300:

Putting x = 0 in 3x + 6y = 300, we get y = $\frac{300}{6}$ = 50

Putting y = 0 in 3x + 6y = 300, we get x = $\frac{300}{3}$ = 100.

$\therefore$ The line 3x + 6y = 300 meets the coordinate axes at (0,50) and (100,0). Joining these points by a thick line.

Now, putting x = 0 and y = 0 in 3x + 6y $\leq$ 300, we get 0 $\leq$ 300

Therefore (0,0) satisfies the inequality 3x + 6y $\leq$ 300. So, the portion containing the origin represents the solution set of the inequation, 3x + 6y $\leq$ 300.

Region represented by 8x + 4y $\leq$ 480:

Putting x = 0 in 8x + 4y = 480, we get, y = $\frac{480}{4}$ = 120

Putting y = 0 in 8x + 4y = 480, we get, x = $\frac{480}{8}$ = 60

$\therefore$ The line 8x + 4y = 480 meets the coordinate axes at (0,120) and (60,0). Join these points by a thick line.

Now, putting x = 0 and y = 0 in 8x + 4y $\leq$ 480, we get 0 $\leq$ 480.

Therefore (0,0) satisfies the inequality 8x + 4y $\leq$ 480.

So, the portion containing the origin represents the solution set of the inequation, 8x + 4y $\leq$

Region represented by x $\geq$ 0 and y $\geq$ 0. clearly, x $\geq$ 0 and y $\geq$ 0 represent the first

The common shaded region of the above five regions represented the solution set of the given inequations as shown below:
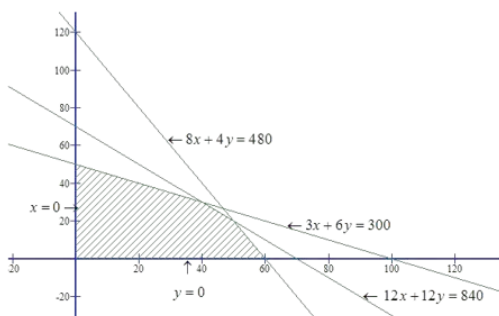
38. Answer the following questions

    a) Here f (x) = 1-|x - 3|

       f(x) is defined for all $x \in R$

       Thus domain of f (x) = R.

       Now $|x - 3| \geqslant 0$

       $\Rightarrow -1|x - 3| \leqslant 0$

       $\Rightarrow 1 - |x - 3| \leqslant 1$

       $\Rightarrow f(x) \leqslant 1$

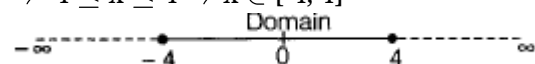   Thus range of $f(x) = (-\infty, 1]$

    b) $f(x) = \sqrt{16 - x^2}$

       Domain of f: We observe that f(x) is defined for all x satisfying

       $16 - x^2 \geq 0 \Rightarrow x^2 - 16 \leq 0$

       $\Rightarrow (x - 4)(x + 4) \leq 0$

       $\Rightarrow$ -4 $\leq$ x $\leq$ 4 $\Rightarrow$ x $\in$ [-4, 4]

       Range of f: Let y = f(x). Then,

y = $\sqrt{16 - x^2} \Rightarrow y^2 = 16 - x^2$

$\Rightarrow x^2 = 16 - y^2$

$\Rightarrow$ x = $\pm\sqrt{16 - y^2}$

Clearly, x will take real values, if

$16 - y^2 \geq 0 \Rightarrow y^2 - 16 \leq 0$
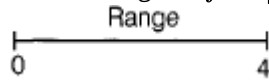
$\Rightarrow (y - 4)(y + 4) \leq 0$

$\Rightarrow$ - 4 $\leq$ y $\leq$ 4

$\Rightarrow$ y $\in$ [- 4,4]

Also, y = $\sqrt{16 - x^2} \geq 0$ for all x $\in$ [-4, 4]

$\therefore$ y $\in$ [0, 4] for x $\in$ [-4, 4]

Hence, range of $f = [0, 4]$

Range

|—————————————|

0   4

Solution

Class 11 - Biology

Half Yearly (2019-20)

Section A

1. (b)
   Division

   Explanation:
   Division is the highest category of hierarchy which contain organisms having only a few common characters. On the other hand, species belongs to lowest level so, the organisms have more common characters.

2. True,
   Explanation: It is observed that virus, when independent (not inside the host), acts as a non - living organism. It does not show any movement or growth signs.
   But, the moment the virus enters the host, all the signs and symptoms of a living organism and starts to move, grow, respire and reproduce

   OR

   Flower

3. Malpighian tubules.

4. Ribosome

5. Rubber, Spices, Drugs, Pigments etc.

   OR

   No. DNA replication is necessary for mitosis.

Section B

6. Keys are pairs of two contrasting characters. Selection of one character leads to rejection of another character while identifying a particular species or genera or family and so on.
   For example presence or absence of hair on body can give a clue if an animal belongs to mammalian or not.

7. The angiosperms dominate the Earth's surface and vegetation in more environments, particularly terrestrial habitats, than any other group of plants. As a result, angiosperms are the most important ultimate source of food for birds and mammals, including humans.
   In addition, the flowering plants are the most economically important group of green plants, serving as a source of pharmaceuticals, fibre products, timber, ornamentals, and other commercial products.

   OR

   Cynobacteria, also known as 'blue green algae' help in carbon fixation in a major way on the ocean surface. They are helpful in nitrogen fixation in paddy fields leading to a better harvest.
   About 80% of photosynthesis on ocean surface is done by cynobacteria. So, it can be said that they play a major role in our ecology.

8. .(a) Platyhelminthes are acoelomate, while Aschelminthes are pseudocoelomates. This indicates development of mesoderm.
   (b) In Platyhelminthes both sexes are on the same animal, while in Aschelminthes there is segregation of sexes. This shows another point of evolution.

9. In prokaryotes the extension of plasma membrane into cell makes a membranous structure called mesosome. They help in cell wall formation, and DNA replication.

   OR

   An elaborate network of filamentous proteinaceous structures present in the cytoplasm is called the cytoskeleton

10. Analysis of chemical composition gives an understanding of basic constituents of the living organisms. Apart from that chemical analysis is also used to diagnose various diseases.

11. Meiosis occurs in Androecium and Gynoecium of a flower. As gamete formation takes place in Androecium and Gynoecium, meiosis division occurs in these parts of a flower.

12. ○ The division of cytoplasm is called cytokinesis, while the division of nucleus is called karyokinesis.

- Karyokinesis occurs first, followed by cytokinesis.

Section C

13. Taxonomical aids help scientists keep a record and study common and uncommon characteristics of animals and plants.

    This study helps them to decide about the correct place of a species in the given taxonomical category.

    - **Herbarium** . Collected plant species are dried for preservation. The place where they are kept as collection is known as herbarium.
    - **Botanical Gardens.** Here live plants are reared for ready reference. Through live plants botanists can study certain features, like mode of reproduction, pattern of pollination etc.
    - **Museums.** Dead animal specimens are preserved in museums. Extinct species, like Dodo are kept in certain museum and act as good reference source.
    - **Zoological Parks.** They are helpful in studying live specimens of animal species. Certain ferocious animals are easier to study in zoological parks.
    - **Keys.** Keys are pairs of contrasting characters, out of which either of the characters is carried forward across generations and another is discarded to gain better adaptability. These keys are good tool to understand how complex organisms evolved from simpler organisms.
    - **Manuals and Records.** Manuals and records show historical data about flora and fauna of a particular geographical location.

    OR

    Phylum. Phylum comes next to Kingdom in the taxonomical hierarchy. All broad characteristics of an animal or plant are defined in a phylum. For example all chordates have a notochord and gill at some stage of life cycle. Similarly all arthopods have joined legs made of chitin.

    Order. Order further zeroes down on characteristics and includes related genus. For example humans and monkeys belong to the order primates. Both humans and monkeys can use their hands to manipulate objects and can walk on their hind legs.

    Genus. Comprises a group of related species which has more characters in common in comparison to species of other genera. We can say that genera are aggregates of closely related species. For example, potato, tomato and brinjal are three different species but all belong to the genus Solanum. Lion (Panthera leo), Leopard (P. pardus) and tiger (P. tigris) with several features, are all species of the genus Panthera. This genus differs from another genus Felis which includes cats.

    Species. Taxonomic studies consider a group of individual organisms with fundamental morphological similarities as a **species** . One should be able to distinguish one species from the other closely related species based on he distinct morphological differences.

14. Dianoflagellates can be of different colours depending on the type of pigment present. The red dianoflagellate sometimes multiply at a very rapid rate. This is called as algal bloom. This gives a red appearance to the part of affected sea. This is also known as 'red tide'. Toxins released by them can kill other marine species.

15. **Virus Structure:** Outside a host cell, virus is a crystalline structure, composed of protein. Inside the crystal, there is genetic material, which can be either RNA or DNA. No virus has both RNA and DNA. Viruses, infecting plants, have single stranded RNA. Viruses, infecting animals, have either single or double stranded RNA or double stranded DNA. The protein coat is called capsid. Capsid is made of smaller subunits, called capsomeres, it protects nucleic acid.

16. Plant kingdom is rich with a large number of species. At every stage of evolutionary development there are interesting examples of new structures coming up to give better tools of survival to the plant.

    The natural habitat of algae is water, so they can be compared to aquatic animals. As life started in the aquatic environment so algae are the most primitive group of plants. Moreover, their structure is simple with no special organs for special functions.

    The way amphibian animals are like a linking point between aquatic and terrestrial life, bryophytes show the same characteristic. Bryophytes need water to facilitate reproduction although they live on soil. In bryophytes we witness some development of leaf-like structures and root like structures. Antheridiopore and Archegoniopore can be compared to flowers of angiosperms.

    When we analyze Pteridophytes we can see development of vascular tissues for transport of substances. Pteridophytes show true roots as well. While the dominant phase is gametophyte in bryophytes it is sporophyte in Pteridophytes. This is another indication of evolution.

    Gymnosperm look more like a common plant, with well defined roots and stem. Appearance of seeds is

another indicator of development. Seeds gave the ability to survive longer durations of adverse conditions. Angiosperms are more advanced because of many factors. The seed is covered, which means more protection to the embryo. Appearance of flowers was a means to facilitate cross pollination to the embryo. Appearance of flowers was a means to facilitate cross pollination for more variations. Angiosperms can modify almost any part for special purpose. For example, certain plants store excess food in modified leaves or stems or roots.

This essay is an interesting description of how from simple thalloid algae plants have developed into more complicated angiosperms. While algae have a simple thallus to carry out all biological functions, angiosperms have dedicated tissue systems for various functions.

17. Reduction division or meiosis takes place in gametic cells. The role of meiosis is to halve the number of chromosomes so that once fertilization takes place the embryo thus formed will be having similar number of chromosomes as in parent somatic cells. In plants sometimes the dominant phase will contain all of diploid stage or all of haploid stage. There can be a brief interspersal of other stage. This is known as the alternation of generation.

(1) Sporophytic generation is represented only by the one-celled zygote. There are no free-living sporophytes. Meiosis in the zygote results in the formation of haploid spores. The haploid spores divide mitotically and form the gametophy. The dominant, photosynthetic phase in such plants is the free-living gametophyte. This kind of life cycle is termed as haplontic, e.g., a|gae

(2) On the other extreme, is the type where in the diploid sporophyte is the dominant, photosynthetic independent phase of the plant. The gametophytic phase is represented by the single to few celled haploid gametophyte. This kind of lifecycle is termed as diplontic. All seed-bearing plants i.e. gymnosperms and angiosperms, follow this pattern. Meiosis results in formation of male and female gametes.

(3) Bryophytes and pteridophytes, interestingly, exhibit an intermediate condition (Haplo-diplontic) both-phases are multicellular and often free-living. However they differ in their dominant phases. The meiosis takes place in he sporophytes to produce haploid spores.

<div align="center">OR</div>

Prokaryotic cell Eukaryotic cell

Nuclear membrane absent

Nuclear membrane present

Cell organelles absent (except ribosome)

Cell organelles present

Endomembrane system absent

Endomembrane system present

Example: bacteria

Example: RBC, neuron

18. **Steps to Follow for Classification:**

1. **Identify Levels of Organization.** Identify if it is cellular level of organization or tissue level of organization.

2. **Identify Body Symmetry.** Find if the animal is having a radial body symmetry or a bilateral body symmetry.

3. **Presence or Absence of Body Cavity.** This will give a clue if the animal belongs to acoelomata or pseudocoelomata or coelomata.

Once these steps have been followed a fair idea can be derived about animal. It can be inferred if the animal is multicellular or unicellular. It can be known if the animal is a chordate or a non-chordate.

<div align="center">OR</div>

- During microsporogenesis in flowering plants the four daughter cells formed are equal in size.
- On the other hand, during megasporogenesis the four daughter cells formed are unequal in size.
- This can be seen in many other organisms also during the formation of male and female gametes. Meiosis usually leads to formation of equal sized male gametes and unequal sized daughter cells during the formation of female gametes.
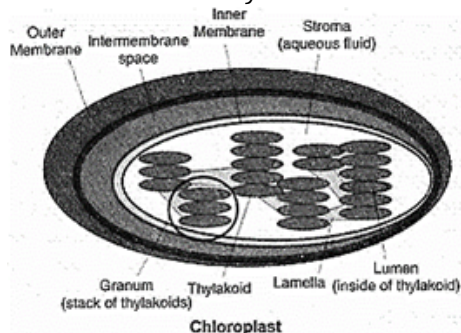
19. **Two double membrane-bound cell organelles:**

i. **Mitochondria:** It has finger-like folds in the inner membrane called cristae. Mitochondria is the place for aerobic respiration.
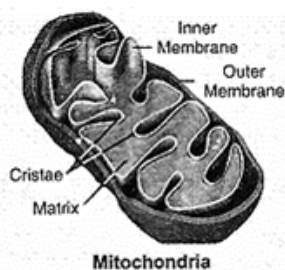
Mitochondria

ii. **Chloroplast:** The chloroplast is responsible for converting light energy into chemical energy. Chloroplast contains stacked thylakoid in its matrix.


Chloroplast

20. In amoeba all functions are carried out by the single cell. Especially when amoeba ingests food through phagocytosis or pinocytosis then it makes a vacuole around the food particle. The vacuole in amoeba is contractile in nature.
    This contractility is important to accommodate food of various sizes and to have enough digestive enzymes. Moreover, amoeba being an aquatic animal the contractile vacuole helps in maintaining the tonocity of the cell as well.

21. For nucleic acids, the building block is a nucleotide. A nucleotide has three chemically distinct components. One is a heterocyclic compound, the second is a monosaccharide and the third a phosphoric acid or phosphate.
    The heterocyclic compounds in nucleic acids are the nitrogenous bases named adenine, guanine, uracil, cytosine, and thymine. Adenine and Guanine are substituted purines while the rest are substituted pyrimidines.
    The skeletal heterocyclic ring is called as purine and pyrimidine respectively. The sugar found in polynucleotides is either ribose (a monosaccharide pentose) or 2' deoxyribose. A nucleic acid containing deoxyribose is called deoxyribonucleic acid (DNA) while that which contains ribose is called ribonucleic acid (RNA).

22. **Classification and Nomenclature of Enzymes**
    Thousands of enzymes have been discovered, isolated and studied. Most of these enzymes have been classified into different groups based on the type of reactions they catalyze. Enzymes are divided into 6 classes each with 4-13 subclasses and named accordingly by a four-digit number.
    Oxidoreductases/dehydrogenases. Enzymes which catalyze oxidoreduction between two substrates S and S'.
    Transferases. Enzymes catalyzing the transfer of a group, G (other than hydrogen) between a pair of substrates S and S'.
    Hydrolases. Enzymes catalyzing the hydrolysis of ester, ether, peptide, glycosidic, C-C, C-halide or P-N bonds.
    Lyases. Enzymes that catalyze the removal of groups from substrates by mechanisms other than hydrolysis leaving double bonds.
    Isomerases. Includes all enzymes catalyzing the interconversion of optical, geometric or positional isomers.
    Ligases. Enzymes catalyzing the linking together of 2 compounds, e.g. enzymes which catalyse the joining of C-O, C-S, C-N, P-O etc. bonds.

23. The interphase is divided into three further phases:
    - G_1 phase (Gap 1). G_1 phase corresponds to the interval between mitosis and initiation of DNA replication. During G_1 phase the cell is metabolically active and continuously grows but does not replicate its DNA.
    - S phase (Synthesis). S or synthesis phase marks the period during which DNA synthesis or replication takes place. During this time the amount of DNA per cell doubles. If the initial amount of DNA is

denoted as 2C then it increases to 4C. However, there is no increase in the chromosome number if the cell had a diploid or 2n number of chromosomes at G_1, even after S phase the number of chromosomes remains the same, i.e. 2n.

- G_2 phase (Gap 2). During the G_2 phase, Cell continues to grow and prepare itself for the division. Proteins and RNA required for the cell division are also synthesized.

24.

Meiosis I

Meiosis II
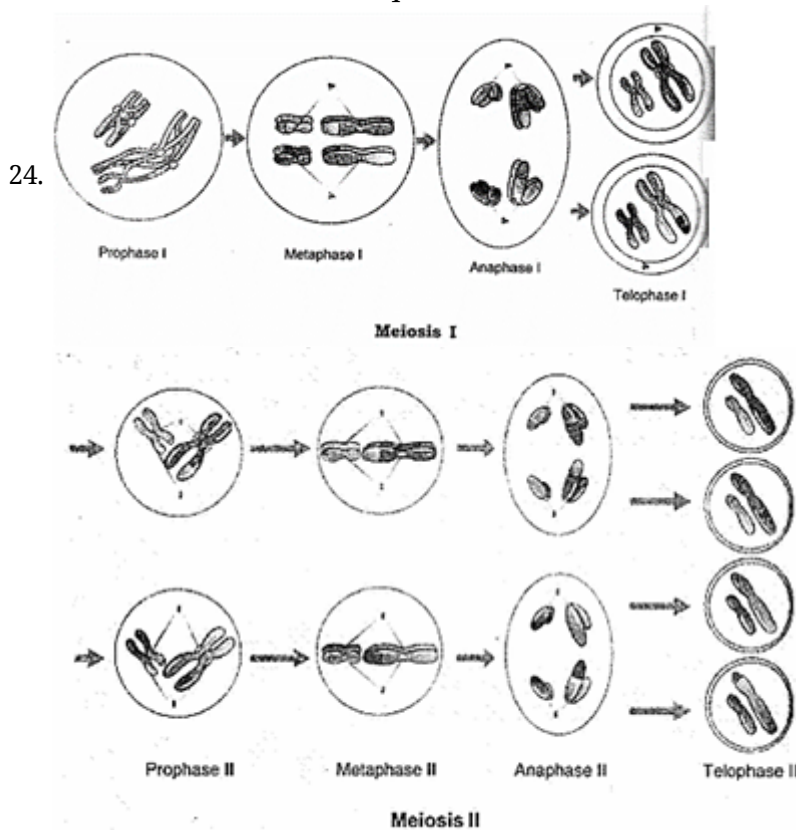
Section D

25. The biodiversity of a geographical location may influence the classification in following ways:
- If there is rich biodiversity then it means number of characters will be in plenty to study.
- Morecharacters will give scientists more clues about possible variations.
- Similarityin characters would indicate towards phylogenetic relation between two or more species.
- On the other hand if a given geographical area is poor in biodiversity then it becomes difficult to study more characters and one has to rely on limited set of characters.
- Richbiodiversity means more resources and more reproduction leading to increased competition for survival. This can lead to emergence of certain new variations. These variations can lead to emergence of an altogether new species.
- One example can be recent discovery of a frog species from the Himalayan region. As Himalayan region is rich in biodiversity so it gives fertile ground for a new species to emerge.

OR

Key Features of Mammalia

Unique Characters. The most unique mammalian characteristic is the presence of milk producing glands (mammary glands) by which the young ones are nourished. They have two pairs of limbs, adapted for walking, running, climbing, burrowing, swimming or flying. The skin of mammals is unique in possessing hair. External ears or pinnae are present. Different types of teeth are present in the jaw.

Circulatory System. Heart is four-chambered. They are homoiothermous. Respiration is by lungs.

Reproduction. Sexes are separate and fertilization is internal. They are viviparous with few exceptions and development is direct.

Mammary glands enable animals of this class in nurturing the progeny for a longer duration. This helps in preparing them in a better way in the ways and means of survival. In other words they get trained in getting food and selecting partners for reproduction.

In higher mammals forelimbs are utilized for grabbing things which enables them in handling objects. Especially in human the opposite orientation of thumb compared to other fingers help them in manipulating

tools.

Larger mammals can see up to a great distance because their limbs enable them to hold their eyes on a higher plane. This helps them in sensing danger and opportunity from a greater distance so that they can react accordingly.

Presence of hair on body gives better insulation against temperature. So, most of the mammals can survive in variety of environmental conditions.

Majority of them are viviparous. This means there is lesser strain on body of the female and a longer life span for her. Moreover, this also ensures that the offspring can be of very large size.

Heart is four chambered, so there is complete segregation of oxygenated and deoxygenated blood. This is a more efficient mode of exchange of gases. This enables mammals to do more vigorous physical activities.

Presence of teeth enables mammals to ingest more variety of food. So, mammals can be herbivorous, carnivorous and omnivorous. This enables mammals to utilize more natural resources compared to other animals.

Presence of external ear helps them in catching sound waves from a longer distance. Once again the advantage is of sensing opportunity and danger from a larger distance. This gives ample of reaction time to mammals.

They are homoiothermous which means they can control their body temperature and don't have to depend on external environment for that. No matter what is the environmental condition.

26. **Prokaryotic Cells.** In prokaryotic cells nuclear membrane is absent. It means that genetic materials are without an envelope. Cell lumen is filled with a fluid called cytoplasm. Cytoplasm contains ribosomes as well. Bacteria, and blue green algae are prime examples of prokaryotes.

Cell Envelope. Most prokaryotic cells, particularly the bacterial cells, have a chemically complex cell envelope. The cell envelope consists of a tightly bound three layered structure i.e., the outermost glycocalyx followed by the cell wall and then the plasma membrane. Although each layer of the envelope performs distinct function, they act together as a single protective unit.

The plasma membrane is semi-permeable in nature and interacts with the outside world. This membrane is similar structurally to that of the eukaryotes. A special membranous structure is the mesosome which is formed by the extensions of plasma membrane into the cell. These extensions are in the form of vesicles, tubules and lamellae. They help in cell wall formation, DNA replication and distribution to daughter cells. They also help in respiration, secretion processes, to increase the surface area of the plasma membrane and enzymatic content. In some prokaryotes like cyanobacteria, there are other membranous extensions into the cytoplasm called chromatophores which contain pigments.

OR

Features of Plant Kingdom:

- Plants are autotrophic, except for some carnivorous plants. They trap photo energy from sunlight and convert it to chemical energy through photosynthesis. Because of these plants are the main channel for supplying energy in the food chain on earth.
- Reproduction in plants can be by any of the following modes: Vegetative or Asexual, and Sexual Reproduction.
- The plant cell is unique because of the presence of cell wall and large vacuoles. Green parts of plant contain chlorophyll, which helps them in trapping the photo energy.
- Sizes of plants can vary from microscopic to a very large tree. Plants are mainly divided into Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.
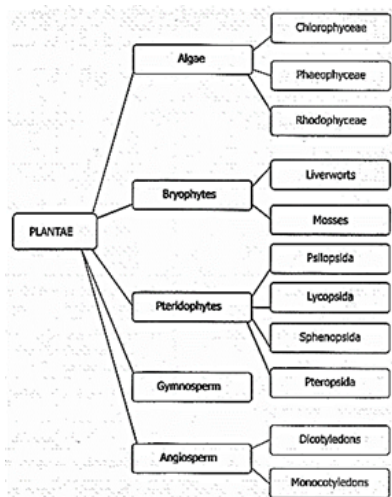
- Lower plants, like algae and bryophytes, have thalloid structure, while higher plants, like gymnosperms and angiosperms, have clearly defined roots and stems.
- In higher plants root gives a means to anchor in the soil and helps the plant in taking minerals and water from the soil. Green leaves on the stem help them in photosynthesis.
- Most of the plant grow as a result of photosynthesis. After photosynthesis, extra food is utilized to facilitate growth.
- Usually in higher plants growth is unlimited and some taller trees can live a life of more than 1000 years.
- Being the main carbon fixation agents, plants are very important for the whole ecology.
- The whole food basket for humans is being filled by the plant kingdom. Even animal products, like milk and poultry, are indirect results of plants carbon fixation.
- Plants supply raw materials for a majority of economic activities. Wood for furniture and building materials come from plants. The whole paper industry is dependent on plant kingdom. Think of a life if there was no paper and you may understand the larger impact on human civilization.
- Angiosperms have special organs, called flower, to bear sexual parts. Flowers are helpful tool in facilitating variations and further evolution of the plant kingdom.

27. One of the greatest discoveries ever made was the observation that all biomolecules have a turnover. This means that they are constantly being changed into some other form of the biomolecule and also made from some other biomolecules. This breaking and making is through chemical reactions constantly occurring in living organisms. Together all these chemical reactions are called metabolism. Each of the metabolic reactions results in the transformation of biomolecules. A few examples for such metabolic transformations are the removal of CO_2 from amino acids converting an amino acid into an amine, removal of the amino group in a nucleotide base, hydrolysis of a glycosidic bond in a disaccharide, etc.

   i. **Metabolic pathways:** Majority of these metabolic reactions do not occur in isolation but are always linked to some other reactions. In other words, metabolites are converted into each other in a series of linked reactions called metabolic pathways.
These pathways are either linear or circular. These pathways crisscross each other, i.e., there are traffic junctions. Flow of metabolites through metabolic pathway has a definite rate and direction like automobile traffic. This metabolite flow is called the dynamic state of body constituents. What is most important is that this interlinked metabolic traffic is very smooth and without a single reported mishap for health conditions. Another feature of these metabolic reactions is that every chemical reaction is a catalysed reaction. There is no uncatalysed metabolic conversion in living systems.
The catalysts which hasten the rate of a given metabolic conversation are also proteins. These proteins with catalytic power are named enzymes.

   ii. **Anabolic Pathways:** Anabolic pathways convert simpler molecules to complex molecules. Anabolic pathways consume energy to synthesize something.

   iii. **Catabolic Pathways:** Catabolic pathways convert complex molecules into simple ones. Catabolic pathways release energy while breaking down chemical bonds. Living organisms have learnt to trap this energy liberated during degradation and store it in the form of chemical bonds. As and when needed, this bond energy is utilized for biosynthetic, osmotic and mechanical work that we perform. The most

important form of energy currency in living systems is the bond energy in a chemical called adenosine triphosphate (ATP).

<center>OR</center>

Prophase I. Prophase of the first meiotic division is typically longer and more complex. It has been further subdivided into the following five phases based on chromosomal behaviour:
- Leptotene
- Zygotene
- Pachytene
- Diplotene and
- Diakinesis.

Leptotene. During leptotene stage the chromosomes become gradually visible under the light microscope. The compaction of chromosomes continues throughout leptotene.

Zygotene:
- During this stage chromosomes start pairing together and this process of association is called synapses. Such paired chromosomes are called homologous chromosomes.
- The chromosome synapses is accompanied by the formation of complex structure called synaptonemal complex.
- The complex formed by a pair of synapsed homologous chromosomes is called a bivalent or a tetrad.
- The first two stages of prophase I are relatively short-lived compared to the next stage that is pachytene.

Pachytene:
- During this stage bivalent chromosomes now clearly appear as tetrads.
- This stage is characterized by the appearance of recombination nodules, the sites at which crossing over occurs between non-sister chromatids of the homologous chromosomes.
- Crossing over is the exchange of genetic material between two chromosomes. Crossing over is also an enzyme-mediated process and the enzyme involved is called recombinase.
- Crossing over leads to recombination of genetic material on the two chromosomes.
- Recombination between homologous chromosomes is completed by the end of pachytene, leaving the chromosomes linked at the sites of crossing over.

Diplotene. The beginning of diplotene is recognized by the dissolution of the synaptonemal complex and the tendency of the recombined homologous chromosomes of the bivalents to separate from each other except at the sites of crossovers. These X-shaped structures are called chiasmata.

Diakinesis. The final stage of meiotic prophase I is diakinesis. This is marked by terminalisation of chiasmata. During this phase the chromosomes are fully condensed and the meiotic spindle is assembled to prepare the homologous chromosomes for separation. By the end of diakinesis, the nucleolus disappears and the nuclear envelope also breaks down. Diakinesis represents transition to metaphase.

Difference between prophase I and prophase II. During prophase I recombination of genes takes place, while in prophase II no such event happens. Prophase I is longer and more complicated compared to prophase II.

Class 11 - Physical Education
Half Yearly(2019-20)
Section A

1. The Aim of physical education is all round development of the personality of the individuals.

2. In the modern world, people are more aware of their health related issues. Each and every person is awake to his health. He remains to be hale and healthy. He wants to adopt a healthy lifestyle. So there is an increase in job opportunities in health related careers in the field of physical education.

    OR

    Physical education is the sum of changes in an individual caused by experience which can bring in by motor activity.

3. It (Olympic games) of 2020 will be held in Tokyo (Japan).

4. The facts or condition of being physically and mentally healthy.

5. Lifestyle is a manner of living that reflects the person's value and attitude.

    OR

    Importance of wellness-

    i. It help in the improvement and tonning up the muscle.

    ii. It reduces the recovery time after injury or illness.

6. Integrated physical education is a comprehensive concept, it is not only limited to physical activities, games, and sports but has become a complete discipline. It is a combination of other subjects with physical education.

7. Inclusion is not a favour we do for students with disabilities. Inclusion means to enable students with special needs to study and learn along with other students.

8. i. Increase social skills.

    ii. Increase motor skills.

9. Yoga nidra is an effortless relaxation. It is an essential wend to any yoga pose sequence. yoga posture warms up the body; yoga nidra 'cools' it down.

10. Unification of Jivatma with parmatama is called Yoga.

    OR

    Complete concentration of mind is dhyana.

Section B

11. Careers are also available in sports industry. A person who wants a careers in sports industry must have knowledge of physical education and sports. One may establish a sports industry at a small scale. It may be related to only T-shirts and Track suits. It may be related to only sports foot wear. The knowledge of research and designing is also vital for such jobs, because new types of sports equipments and new of tracksuits or swimsuits which are beneficial for increasing the performance of sport persons are always in demand.

12. Dronacharya Award was started in 1985. This award is given to those coaches who impart coaching temporality or permanently to the teams or players. The following capabilities are necessary for the eligibility of this award:-
The coach, who has been imparting training to a player or a team of an indigenous sport and that team has raised the standard of the sport during the last three years is also eligible for this award. The coach is also eligible for this award whose player has achieved top position like a won gold medal, silver medal or bronze medal at Olympic games or at world cup tournament. The player who has won the gold medal at Asian Games or Common Wealth Games. This award is presented by youth welfare and Human Resources Developed Minister, Govt, of India. In this award, 5 lakh rupees cash, a symbol of Guru Dronacharya and a certificate are presented to the coach.

13. **Importance of healthy/positive lifestyle are-**

    i. **Increase longevity:** A healthy lifestyle increases longevity. It slows down the aging process and helps the older person to stay strong and healthy.

    ii. **Increase the level of energy:** An individual with a healthy lifestyle feels more energetic which means more productivity in day to day living.

    iii. **Helps in reducing depression:** Healthy lifestyle helps in accomplishing a healthy body which in turn elevates hormone level in the body that regulators the mood.

    iv. **Increase the level of Physical fitness:** Physical fitness helps in better coordination of muscles and an increase in strength, flexibility and endurance.

    v. **Increase self-confidence:** Level of fitness of the individual tends to become more self-confident and self-aware.

    vi. **Helps in coping with stress:** Healthy lifestyle enhances the Psychological power of an individual to cope with the stress as well as anxiety.

14. Healthy diet or good nutrition is one of the main components of positive lifestyle. In fact, a healthy diet of good nutrition is necessary to lead a healthy or positive lifestyle. The basic of a healthy diet are lots of fruits and vegetable, whole grain food and low fat diary products. Such diet required everday in order to maintain the adequate amount of vitamins nutrients and minerals needed to mnaintain a healthy body. That is why it is rightly said that to eat is a necessity but to eat intelligently is an art.

15. **Peer to Peer: Everyone's a player, everyone's a leader**
    Special Olympics believes in the power of sport and in the power of young people to build a more inclusive world. In a high quality Inclusive Physical Education classroom students recognize their abilities to create inclusive communities as they learn to value difference and appreciate each individual's unique gifts and talents.
    Peer to peer teaching is a fundamental strategy for implementing successful Inclusive Physical Education programs, but it is important that it be implemented in a truly inclusive manner and grounded in equality.
    An inclusive peer to peer teaching model provides opportunities for students of all abilities to participate as leaders in some way, reinforcing and confirming the potential of every student to lead and contribute meaningfully.

16. i. Assess student's skills to determine their needs and to develop teaching plans.
    ii. Adapt lessons to meet the needs of students.
    iii. Develop Individualised education programs (IEPs) for students.
    iv. Plan, organize and assign activities that are specific to each student's ability.
    v. Implement IEPs, assess students.
    vi. Update IEPs throughout the school year to reflect student's progress and goals.

    <div align="center">OR</div>

    i. It should be based on the inter related sub-topics of physical education.
    ii. It should cater to the requirements of different people.
    iii. It should be capable of facing the challenges of the present and the future.
    iv. It should be capable of providing comprehensive and deep knowledge about physical education.

17. **Steps of Sukhasana:** Sit on the floor with legs stretched out. Always use a yoga mat or a cushion or a carpet while sitting on the floor. Fold the left leg and tug it inside the right thigh. Then fold the right leg and tug it inside the left thigh. Keep the hands on the knees. Jnana mudra or Chin mudra can be used if you are using

this posture for meditation. Sit erect with spine straight. Relax your whole body and breathe normally. Maintain this position for as long a comfortable.

Benefits To Body Part: There are many physical, emotional and mental benefits associated with this pose, some of which include-

- Amplifying your state of serenity and tranquillity
- Broadens your collarbones and chest
- Calming your brain

Precautions:

i. Don't do sukhasana in inflammation in the knee or hip, spinal disc problems and chronic knee injuries.

ii. Perform this asana under the Guidance and supervision of a certified Yoga guru at least until you master it.

18. **Procedure:**

i. Stand erect, and place your legs slightly apart, with your hands hanging alongside your body.

ii. You must make your thigh muscles firm.

iii. Strengthen the inner arches of your inner ankles as you lift them.

iv. Now, imagine a stream of white light **(energy)** passing through your ankles, up to your inner things, gently turn your upper things inward. Elongate the tailbone such that it is toward the floor. Lift the pubis such that it is closer to the navel.

v. Look slightly upward.

vi. Now breath in and stretch your shoulders, arms and chest upwards. Raise your heels, making sure your body weight is on your toes.

vii. Feel the stretch in your body right from your feet to your head. Hold the pose for a few seconds. Then, exhale and release.

Precautions: It is best to avoid this asana if you have the following problems-

i. Headaches

ii. Insomnia

iii. Low blood pressure

Benefits of Tadasana:

i. This asana helps improve body posture.

ii. Your buttocks and abdomen get toned.

iii. This asana reduces flat foot.

iv. It also makes your spine more agile.

v. It is an excellent asana for those who want to increase their height in their formative years.

vi. It also helps improve balance.

OR

i. The stomach has to be empty or light before the practice It is not recommended to practice Yoga asanas or Yoga Nidra after a full meal.

ii. A comfortable clutter-free space A yogi's home is calm, comfortable.

Section C

19. The Sports was by no means a Greek invention. Despite severe condition of life; athletes down the history, men found time to enjoy a variety of sports. According to available history, the first ancient Olympic games were started in Olympic valley in 776 B.C. at that time that games were held in honour of God Zeus, later on. Hercules started the games and sports in the honour of his father. Although there was a lot of stories about the origin of ancient Olympic games. According to some other learned person there was wrestling competition between God Zeus and God Kornus in which the organization of games and sports was started. Whatever the reason behind the beginning of the game Olympic game was in beautiful valley named Olympia, due to this feet these games were called Olympic Games. During the games period or month any war or dispute might be taking place, would be stopped at once and a true would be declared.

The games were conducted in following way:-

i. Opening Ceremony

ii. Assembly

iii. Oath

iv. Awards

v. Events

The Ancient Olympic Games continued and was held for approximately thousand fears. In 394 A.D. The king of Rome stopped the organization of games, stadium were destroyed and revived after many decades, that called Modern Olympic Games.

20. Recognition of any outstanding achievements is highly motivating and more so when it comes from the top functionary of prevailing system. The Govt. of India, sports has instituted following national awards for outstanding sports persons and coaches.

i. **Arjuna Award**
ii. **Rajiv Gandhi Khel Ratna Award**
iii. **Dronacharya Award Arjuna Award**

Arjuna award is the supreme honour which is awarded to sports person by the govt. of India. This award is given to such sports person who has given extraordinary performance in their field for last three years. This award was started in 1961 in the name of Arjuna in Mahabharata. This award includes a statue of Arjuna and five lakh rupeers cash, the president of India presents this award on 29th August (The birthday of legendary, hockey wizard Late Dhyan Chand, olympian every year.)

Rules for Arjuna Award:-

i. It's main aim is to improve the standards of sports in the country.
ii. The Govt, of India demands a list of sports persons from National Sports federations which is recognised.
iii. The total number of Arjuna awards are restricted to 15, one award in each discipline, however it can be increased in extraordinary performance by a sports person.
iv. Sports Federation sends a list of three players, in which one will be selected but in case of female two awards will be given one male and one female.

21. i. **Physical development:-** Development of organ systems such as circulatory system, nervous system, muscular system, digestive system etc.
ii. **Mental development:-** Physical activities require alertness of mind, deep concentration and calculated movement. This objective is related to the mental development of an individual.
iii. **Social development:-** This objective is related to the development of social traits, which are essential for better adjustment in life. it is a better source for attaining the qualities like. Co-operation, fair play, sportsmanship tolerance and sympathy.
iv. **Neuro Muscular Co-ordination:-** This objective is centered with a better relationship between nervous system. Education provide ample opportunities of physical neuromuscular coordination.
v. **Emotional Development:-** The emotional development of an individual is also the major objectives of physical education every individual has various types of emotions viz. Pleasure, hope, jealously, hateredness, fear, depression, anger, wonder, lust loneliness etc.

vi. **Development of Health:** This develops health related habits through health education. This also provides education about the prevention of communicable disease.

22. **Components of wellnes:**

   i. **Physical Activity:-** It makes the person fit and active. It improves various system of body and improves our health. It also improves our growth and development.

   ii. **Balanced Emotional life:-** Wellness requires balanced emotional life and release of emotions. More ever it should be under control.

   iii. **Intellectual Attitude:-** Wellness requires positive intellectual attitude. It improves our behaviour, intelligence, alertness, futuristic and insight thinking.

   iv. **Spiritual wellness:-** It makes the person ethically good, morally good, peaceful more over guides the value of life.

   v. **Occupational wellness:-** It makes the person to be hard worker and earn the livelihood with honesty. It helps to achieve the balance of work and leisure and gives satisfactions.

   vi. **Managing Stress:-** Wellness needs the proper management of stresses and tension of life. It keeps us calm and controls our anxiety.

OR

There are five physical fitness components they are :

   i. **Speed:-** It is ability to perform movement at a faster rate or it is the ability to perform movement in a short period of time and sports e.g. practicing with faster rhythm, speed endurance, repetition method acceleration runs, etc.

   ii. **Strength:-** It is an ability of muscle to overcome or to act against resistance exercise, pushups, etc.

   iii. **Endurance:-** It is the ability to sustain or continue activity of it is the ability to rest fatigue. It is one of the important components for middle and long distance races and it is required for almost all major games like football, hockey, and basketball.

   iv. **Flexibility:-** It is the capacity of a muscle to extend without any damage. Flexibility is measured by range of motion around a joint. It is affected by muscle length, joint structure and other factors, it is measured through flexometer.

v. **Co-ordinate ability:-** It is the ability of the body to perform movement with perfection and efficiency. In other words it is ability to change movement or direction in the shortest time without getting disbalanced.

23. A defining characteristic of an excellent physical education program is that it includes students with a diverse range of abilities, needs, interests and learning styles in meaningful learning experiences. The term "Inclusive Physical Education" reflects a program where respect and acceptance of all students, specifically students with disabilities, is an essential component of the classroom environment and teaching strategies.

    Inclusion is about creating a classroom in which every student is welcomed, valued, respected and enabled to reach his her full potential. In a successful Inclusive Physical Education program, all students are fully engaged in instructional activities, sharing equally and learning together. Although the activities may be modified or adapted, students with disabilities learn the same concepts, skills, and content as all other students in the class. The result is educational equity and access for all students!

    Inclusive Physical Education requires educators to believe in the concept that success for each student can be different The educator must be willing to modify and adapt lessons and activities to ensure that every student learns and achieves success at his own pace and according to his own abilities. Educators see the abilities of all students as contributing to the whole class. Effective teaching for students with disabilities is basically the same as effective teaching for all students.

24. **Self-care** – An occupational therapist will help a child perform and be independent in self-care skills like casting, dressing, toileting, bathing and grooming.

    Play – An occupational therapist helps children participate and interact with others in play. They may suggest modifying cations in the position, mobility aids or modified toys to help a child to play.

    School - Occupational therapists help children participate and accept to regular school. They may suggest aids for writing and other classroom activities to help them participate equally with other children. Children with special needs may also require special furniture to help them sit and write better.

    Environmental modifications: Occupational therapists can suggest modifications in the house, school or playground that will help the child

participate more easily. Helping the child become independent early in life, will encourage them to live independently as an adult.

Fine motor skills and Handwriting- occupational therapists also play a role in helping a child improve their fine motor skills handwriting. They will be able to identify the specific deficits int the child and suggest activities that will help improve these skills.

Splinting- Occupational & learapists can also make simple splints to help the child perform activities in a better way.

Pediatric treatment - Physiotherapy can be used to treat children affected by Muscular Dystrophy'. These and other conditions may require the child to have help to improve balance, strength and coordination.

Techniques of physiotherapy:

  i. Massage and manipulation
 ii. Exercise and movement
iii. Electrotherapy
iv. Hydrotherapy

25. **Yog Nidra benefits are:**

  i. It helps in relieving muscular, emotional, and mental tension.
 ii. Yog Nidra relaxes the mind by relieving stress and anxiety.
iii. It treats insomnia, psychological disorders, and psychosomatic diseases.
iv. It trains the mind and helps in enhancing memory and increasing learning capacity.
  v. Yogic sleep also results in increased energy levels.
 vi. It heals endocrinal imbalances.
vii. Yog Nidra not only detoxifies the body but also clears up the subconscious.
viii. It improves creativity.
 ix. It also leads to improved senses and more cultivated body awareness.

OR

How to do a perfect Yog Nidra:

  i. Lie down straight on your back in Corpse Pose (Shavasana). Close your eyes and relax. Take a few deep breaths in and out. Remember to take slow and relaxed breaths and not ujjayi breaths.
 ii. Start by gently taking your attention to your right foot. Keep your attention there for a few seconds, while relaxing your foot. Then gently move your

attention up to the right knee, right thigh and hip. Become aware of your whole right leg.

iii. Gently, repeat this process for the left leg.

iv. Take your attention to all parts of the body: genital area, stomach, navel region chest

v. Take your attention to the right shoulder and right arm, palms and fingers then repeat this on the left shoulder and left arm, torso, face and finally the top of the head.

vi. Take a deep breath in, observe the sensations in your body, and relax in this still state for a few minutes.

vii. Now, slowly becoming aware of your body and surroundings, turn to your right side and keep lying down for a few more minutes. Rolling over to the right side makes the breath low through the left nostril which helps cool the body.

viii. Taking your own time, you may then slowly sit up, and whenever you feel comfortable, slowly and gradually open your eyes.

Yoga Nidra Instructions by Sri Sri Ravi Shakar:

Note that Yoga Nidra is not about conscious effort' but conscious relaxation'. For example, the moment you hear the word'apple,' its image instantly flashes through your mind. You don't need to put in an effort to think about whether it's small or big. red or green. The same happens during yoga nidra.

You don't need to 'concentrate' or focus' on what a leg is, or touch your nose. Nor do you need to physically move these body parts. You only need to gently take your attention to them, while taking deep breaths. The trick in yoga nidra is to: relax with awareness, remain effortless and consciously relax the body and mind.

It is quite natural to be distracted by random thoughts during yoganidra. Do not try and curb them. If you fall asleep naturally, don't feel guilty once you wake up.

Yoga Nidra is thus a joyous, effortless way to end your yoga practice. Let go, relax and enjoy the experience that follows.

"As refreshing as sleep, I fondly call yoga nidra my 'super nap'. In just a short while, it leaves me deeply rested and freshens me up in a way no tea or coffee does," shares Pritika Nair, an avid meditator.