Atomic Energy Central School No. 4, Rawatbhata
Unit Test - II (2019 – 20)
Class XI, ENGLISH

Time – 3 Hours **Maximum Marks – 40**

General Instructions :

(i) This paper is divided into three sections : A, B and C. All the sections are **compulsory.**

(ii) Separate instructions are given with each section and question, wherever necessary. Read these instructions carefully and follow them faithfully.

(iii) Do not exceed the prescribed word limit while answering these questions.

SECTION A – (READING)

1. Read the following passage and answer the questions that follow : 8

Whether work should be placed among the causes of happiness or among the causes of unhappiness may perhaps be regarded as a doubtful question. There is certainly much work which is exceedingly irksome and an excess of work is always very painful. However, work is not to most people less painful than idleness. There are in work all grades, from mere relief to tedium upto the profoundest, delights, according to the nature of the work and the abilities of the worker. Most of the work that most people have to do is not in itself interesting, but even such work has certain great advantages.

To begin with, it fills a good many hours of the day without the need of deciding what one shall do. Most people, when they are left free to fill their own time according to their own choice are at a loss to think of anything sufficiently pleasant to be worth doing. And whatever they decide on, they are troubled by the feeling that something else would have been pleasanter. To be able to fill leisure intelligently is the last product of civilization and at present very few people have reached this level. Moreover, the exercise of choice is in itself tiresome.

Except to people with unusual initiative it is positively agreeable to be told what to do at each hour of the day, provided the orders are not too unpleasant. Most of the idle rich suffer unspeakable boredom as the price of their freedom from drudgery. At times they may find relief by hunting big game in Africa or by flying round the world, but the number of such sensations is limited, especially after youth is past. Accordingly, the more intelligent rich men work nearly as hard as if they were poor.

Work therefore is desirable, first and foremost as a preventive of boredom, for the boredom that a man feels when he is doing something out of compulsion; though uninteresting work is as boring as having nothing to do.

With this advantage of work another is associated, namely that it makes holidays much more delicious when they come. Provided a man does not have to work so hard as to imperil his vigour, he is likely to find far more zest in his free item that an idle man could possibly find.

The second advantage of most paid work and some of unpaid work is that it gives chances of success and opportunities for ambition. In most work, success is measured by income and, while our capitalistic society continues, this is inevitable. However, dull work may be, it becomes bearable, if it is a means of building up a reputation. Continuity of purpose is one of the most essential ingredients of happiness and that comes chiefly through their work.

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 Skills & Grammar)

2. You are Abhinav, a sports lover. Write a letter to the Editor of a local daily expressing your views on improving facilities for sportsmen in 120 – 150 words. **6**

Clues

*Facilities provided are pathetic

*Hockey facilities should be of international standards

*Poor performance in overseas tournaments
* Necessary steps to be taken

OR

You are XYZ from S.K Real Estate Colony, Kota. Recently you read an advertisement in The Times of India pertaining to the vacancy of a P.G.T (Mathematics) in Shiv Jyoti International School, Mahaveer Nagar , Kota – 323305. Write a job application alongwith your biodata to Mr. A.K. Tiwari, Secretary of the school.

3.Fill in the blanks with the right word out of 'must, ought , used to, need, needn't, dare'. **1/2 × 8 = 4**

a. How ---------- you come into my room?
b. Who rings the bell ? He ……. be the postman.
c. You …… not feel sorry for this petty mistake.
d. How …… you tell a lie ?
e. There …… be a well in front of my house.
f. He does not …….. to go against my wishes.
g. She …….. have been ill.
h. At Rawatbhata I ……. walk by the Chambal.

SECTION C – Literature

4. Read the following extract from the poem,'Childhood' and answer the following questions in 15 – 20 words each. **1×3 = 3**

When did my childhood go ?
Was it the day I ceased to be eleven,
Was it the time I realized that Hell and Heaven ,
Could not be found in Geography,
And therefore could not be,
Was that the day !

a. Who is the poet?
b. What is the concept of 'individuality' as reflected in the stanza cited above?
c. How does geography play it's role here?

5. Answer any three of the following questions in 30 – 40 words each. **(3×3 = 9)**

a. What is the holistic and ecological view of the world ?
b. What picture of Mrs. Pearson do you form in the opening of the play and why ?
c. What was Gangadharpant's experience on way to Bombay?
d. What for did Professor Gaitonde enter the forbes Building ? What was his experience there ?

6. Answer the following question in 120 – 130 words. **5**

Give a brief account of Professor Gaitonde's stay and study of history books at Town Hall Library. What riddle was he keen to solve ?

OR

Why does Nani Palkhiwala call the Earth 'The Ailing Planet'. How can we protect it ?

7. Answer the following question in 120 – 130 words. **5**

Describe Mrs. Fitzgerald. How did she help her neighbor Mrs.Pearson to make her the mistress and boss of the family.

OR

Describe how the head teacher made it easy for Albert to leave school.

Atomic Energy Central School No 4

Rawatbhata

CLASS 11 - PHYSICS

Unit Test II (2018-19)

Time Allowed: 1 hour and 30 minutes **Maximum Marks: 35**

Section A

1. What is the moment of inertia of a thin rod of length L and mass M about an axis passing through one end and perpendicular to its length? **[1]**

   a) $\frac{1}{12}$ ML^2 b) ML^2

   c) $\frac{1}{3}$ ML^2 d) $\frac{1}{2}$ ML^2

2. A body of mass 2.0 kg and radius of gyration 0.5 m is rotating about an axis. If its angular speed is 2.0 rad/s, the angular momentum of the body (in kg - m^2/s) is **[1]**

   a) 2.0 b) 0.5

   c) 1.5 d) 1.0

3. Neutron stars, such as the one at the center of the Crab Nebula, have about the same mass as our sun but have a much smaller diameter. If you weigh 675 N on the earth, what would you weigh at the surface of a neutron star that has the same mass as our sun and a diameter of 20 km? **[1]**

   a) 9.06×10^{13} N b) 9.26×10^{13} N

   c) 9.36×10^{13} N d) 9.16×10^{13} N

4. The space shuttle releases a 470-kg communications satellite while in an orbit that is 280 km above the surface of the Earth. A rocket engine on the satellite boosts it into a geosynchronous orbit, which is an orbit in which the satellite stays directly over a single location on the Earth. How much energy did the engine have to provide? **[1]**

   a) 1.09×10^{10} J b) 1.29×10^{10} J

   c) 1.39×10^{10} J d) 1.19×10^{10}J

5. Plasticity is the property of a body, by virtue of which **[1]**

   a) it is distorted or stretches without the application of force

   b) it gets permanently deformed on application of force i.e. shape and size do not change on removal of force

   c) it tends to regain its original size and shape when the applied force is removed

   d) it remains in original size and shape when the force is applied

6. A piece of copper having a rectangular cross-section of 15.2 mm $\times$ 19.1 mm is pulled in tension with 44,500 N force, producing only elastic deformation. Calculate the resulting strain? **[1]**

Take Young's modulus of copper as 11×10^{10} Pa

a) 0.06×10^{-2} b) 0.11×10^{-2}

c) 0.04×10^{-2} d) 0.14×10^{-2}

7. Give the physical significance of moment of inertia. **[1]**
8. Can a body be In equilibrium while in motion? If yes, give an example. **[1]**
9. The force of gravity due to earth on a body is proportional to its mass, then why does a heavy body not fall faster than a lighter body? **[1]**
10. For solids with elastic modulus of rigidity, the shearing strss is proportional to shear strain. On what factor does it depend in case of fluids? **[1]**

Section B

11. In a hydrogen atom, the electron revolves in a circular orbit of radius 0.53 $\mathring{A}$ with a velocity of 2.2×10^6 m/s with an angle 30°. If the mass of electron is 9×10^{-31} kg. Find its angular momentum. **[2]**

OR

If ice on poles melts, then what is the change in duration of day?

12. Define the period of revolution. Derive an expression of a period of revolution or time period of the satellite. **[2]**

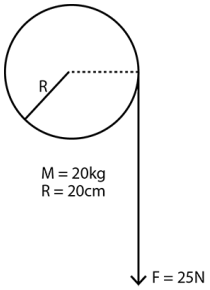
OR

Show that an artificial satellite circling around the earth in an orbit of radius obeys Kepler's third law.

13. Define modulus of elasticity and write its various types. **[2]**

Section C

14. A cord of negligible mass is wound round the rim of a flywheel of mass 20 kg and radius 20 cm. A steady pull of 25 N is applied on the cord as shown in the figure. The flywheel is mounted on a horizontal axle with frictionless bearings. **[3]**



i. Compute angular acceleration of the flywheel.
ii. Find the work done by the pull, when 2 m of the cord is unwound.
iii. Find also the KE of the flywheel at this point. Assume that the flywheel starts from rest.
iv. Compare the answers of parts (ii) and (iii).

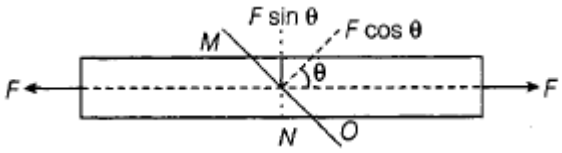
OR

Show that the area of the triangle contained between the vectors a and b is one half of the magnitude of a $\times$ b.

15. What will be the gravitational potential of a body of mass 67 kg at a distance of 6.6×10^{10} m from the centre of the earth? **[3]**
16. A bar of cross-section A is subjected to equal and opposite tensile forces at its ends. Consider a **[3]**

plane section of the bar whose normal makes an angle θ with the axis of the bar.

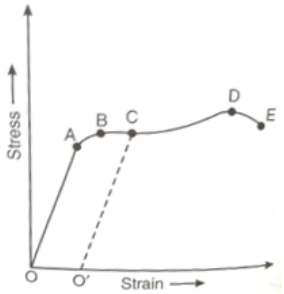
i. What is the tensile stress on this plane?
ii. What is the shearing stress on this plane?
iii. For what value ofθ is the tensile stress maximum?
iv. for what value of $\theta$is the shearing stress maximum?



OR

The stress-strain graph for a metal wire is given in the figure. Up to the point B, the wire returns to its original state O along the curve BAO, when it is gradually unloaded. Point E corresponds to the fracture point of the wire.

i. Up to which point of the curve, is Hook's law obeyed? This point is also called 'Proportionality limit'.
ii. Which point on the curve corresponds to elastic limit and yield point of the wire?
iii. Indicate the elastic and plastic regions of the stress-strain curve.
iv. What change happens when the wire is loaded up to a stress corresponding to point C on a curve, and then unloaded gradually?



Section D

17. i. Find the moment of inertia of a sphere about a tangent to the sphere, given the moment of inertia of the sphere about any of its diameters to be $\frac{2MR^2}{5}$, where M is the mass of the sphere and R is the radius of the sphere. **[5]**
ii. Given the moment of inertia of a disc of mass M and radius R about any of its diameters to be $\frac{MR^2}{4}$, find its moment of inertia about an axis normal to the disc and passing through a point on its edge.

OR

What will be the center of mass of the pair of particles described below on the x-axis?
Three masses 3kg, 4kg & 5kg.are located at the corners of an equilateral triangle of side 1m. Locate the center of mass of the system.

18. Define Gravitational potential energy. Hence, deduce an expression for gravitational potential energy of a body placed at a point near the surface of the earth? **[5]**

OR

How the acceleration due to gravity changes due to altitude and latitude of the earth? Also find the value of escape velocity at earth.

Atomic Energy Central School No 4

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CLASS 11 - CHEMISTRY

Unit Test II (2018-19)

Time Allowed: 1 hour and 30 minutes **Maximum Marks: 35**

Section A

1. Given $N_2\,(g)\ +\ 3H_2\,(g)\ \rightarrow\ 2NH_3\,(g)\ ;\ \Delta_rH^0$= -92.4 kJ mol^{-1} What is the standard enthalpy of formation of NH_3 gas? **[1]**

   a) -41.3 kJ mol^{-1} b) -46.2 kJ mol^{-1}

   c) -56.5 kJ mol^{-1} d) -36.9 kJ mol^{-1}

2. For an isolated system, ΔU = 0, what will be ΔS? **[1]**

   a) ΔS > 0 b) ΔS will increase for some time and then reduce

   c) ΔS < 0 d) ΔS = 0

3. Amines behave as **[1]**

   a) Lewis acids b) Lewis base

   c) aprotic acid d) neutral compound

4. What effect does a catalyst have on the equilibrium position of a reaction? **[1]**

   a) a catalyst favours the formation of reactants b) a catalyst does not change the equilibrium position of a reaction

   c) a catalyst may favour reactants or product formation, depending upon the direction in which the reaction is written d) a catalyst favours the formation of products

5. K_{a_1}, K_{a_2} *and* K_{a_3} are the respective ionisation constants for the following reactions. **[1]**

   $H_2S\ \rightleftharpoons\ H^+\ +HS^-$

   $HS^-\ \rightleftharpoons\ \ H^+\ +\ S^{2-}$

   $H_2S\ \rightleftharpoons\ 2H^+\ +\ S^{2-}$

   The correct relationship between K_{a_1}, K_{a_2} *and* K_{a_3} is

   a) $K_{a3} = K_{a1}/K_{a2}$ b) $K_{a_3} = K_{a_1} \times\ K_{a_2}$

   c) $K_{a3} = K_{a1} - K_{a2}$ d) $K_{a3} = K_{a1} + K_{a2}$

6. Which of the following arrangements represent increasing oxidation number of the central atom? **[1]**

   a) Cro_2^-, Cro_4^{2-}, Mno_4^-, $Cl\ o_3^-$ b) CrO^-_2, ClO^-_3, CrO^{2-}_4, MnO^-_4

   c) Cro_4^{2-}, Mno_4^-, Cro_2^-, $Cl\ o_3^-$ d) $Cl\ o_3^-$, $Cro_4^{(2-)}$, Mno_4^-, Cro_2^-

7. At 298 K, K_p for the reaction $N_2O_4(g) \rightleftharpoons 2NO_2(g)$ is 0.98. Predict whether the reaction is spontaneous or not. **[1]**

8. Define Buffer solution. **[1]**

9. State the law of chemical equilibrium. **[1]**

10. Can the following reaction, **[1]**

$Cr_2O_7^{2-}$ + $H_2O \rightleftharpoons 2CrO_4^{2-}$ + $2H^+$

be regarded as a redox reaction?

Section B

11. Derive the relation between C_p & C_v ? **[2]**

OR

What is the relation between the enthalpy of reaction and bond enthalpy?

12. A reaction between ammonia and boron trifluoride is given below: **[2]**

$: NH_3 + BF_3 \rightarrow H_3N : BF_3$

Identify the acid and base in this reaction. Which theory explains it? What is the hybridization of B and N in the reactants?

13. Calculate the oxidation number of phosphorus in the following species: **[2]**

a. HPO_3^{2-}

b. PO_4^{3-}

Section C

14. For the reaction, $2A(g) + B(g) \longrightarrow 2D(g); \Delta U^\circ = -10.5\text{kJ}$ and $\Delta S^\circ = -44.1\text{JK}^{-1}$. **[3]**

Calculate ΔG° for the reaction and predict whether the reaction may occur spontaneously.

(R = 8.314 $\times$ 10^{-3} kJ mol^{-1}, T = 298 K)

15. What is the minimum volume of water required to dissolve 1g of calcium sulphate at 298 K. **[3]**

For calcium sulphate, $K_{sp} = 9.1 \times 10^{-6}$.

OR

The ionization constant of phenol is 1.0×10^{-10}. What is the concentration of phenolate ion in 0.05 M solution of phenol? What will be its degree of ionization if the solution is also 0.01 M in sodium phenolate?

16. Consider the elements; **[3]**

Cs, Ne, I, F , N_2

and identify the element that exhibits,

i. -ve oxidation state.

ii. +ve oxidation state.

iii. both +ve and -ve oxidation states.

iv. neither exhibits +ve nor -ve oxidation state

v. .exhibit zero oxidation state

Section D

17. The standard Gibbs energy change for the reaction $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ is - 33.2 kJ mol^{-1} at 298 K. **[5]**

i. Calculate the equilibrium constant for the above reaction.

ii. What would be the equilibrium constant if the reaction is written as
$\frac{1}{2}\mathrm{N}_2(g) + \frac{3}{2}\mathrm{H}_2(g) \rightleftharpoons \mathrm{NH}_3(g)$

iii. What will be the equilibrium constant if the reaction is $\mathrm{NH}_3(g) \rightleftharpoons \frac{1}{2}\mathrm{N}_2(g) + \frac{3}{2}\mathrm{H}_2(g)$

OR

Calculate the pH of the following solutions:

a. 2g of TlOH dissolved in water to give 2 litre of the solution

b. 0.3 g of $Ca(OH)_2$ dissolved in water to give 500 mL of the solution

c. 0.3 g of NaOH dissolved in water to give 200 mL of the solution

d. 1 mL of 13.6 M HCl is diluted with water to give 1 litre of the solution.

18. On the basis of Le Chatelier principle explain how temperature and pressure can be adjusted to increase the yield of ammonia in the following reaction: **[5]**

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

ΔH = -92.38 $kJmol^{-1}$

What will be the effect of the addition of argon to the above reaction mixture at constant volume?

OR

Balance the redox reaction by an ion-electron method:

$MnO\bar{4}(aq) + l^-(aq) \longrightarrow Mno_2(s) + l_2(s)$ (in basic medium)

Atomic Energy Central School No 4

Rawatbhata

CLASS 11 - MATHEMATICS

Unit Test-II (2019-20)

Time Allowed: 1 hour and 30 minutes **Maximum Marks: 40**

General Instructions:

Note: All qustions are compulsory.

Section A

1. $\sum_{r=0}^{n} 4^r .^n C_r$ is equal to **[1]**

   a) 6^n b) 5^{-n}

   c) 4^n d) 5^n

2. The coefficient of x^7 in the expansion of $(1-x)^4(1+x)^9$ is **[1]**

   a) -84 b) -36

   c) 36 d) 84

3. Fill in the blanks: **[1]**

   The general term in the expansion of $(x^2 - y^2)^6$ is equal to _____.

   OR

   Fill in the blanks:

   The total number of terms in $(a + b)^n$ is _____.

4. The sum of first eight terms of a G.P. is 82 times the sum of first four terms. The common ratio of the G.P. is **[1]**

   a) 3 b) 2

   c) 5 d) 4

5. Match the following: **[2]**

(a) The equation of the line, which makes intercepts 5 and -2 on the x- and y-axes respectively	(i) False
(b) Equation of the line whose perpendicular distance from the origin is 4 units and the angle which the normal makes with the positive direction of the x-axis is 60°.	(ii) True
(c) Equation of a line is 3x – 4y + 10 = 0 then its slope is $\frac{3}{4}$	(iii) $x + y\sqrt{3} = 8$
(d) Equation of a line is 3x – 4y + 10 = 0 then its slope is $\frac{4}{3}$	(iv) 2x - 5y = 10

6. The nth term of the sequence 5 + 55 + 555 + ... is **[1]**

   a) none of these b) $\frac{5}{9}(10^n - 1)$

   c) $5 \times 10^{n-1}$ d) $5 \times 11^{n-1}$

   OR

   The sum of first three terms of a G.P. is to the sum of next three terms is 125 : 27. The common ratio of the G.P. is

   a) $\frac{1}{2}$ b) $\frac{5}{3}$

   c) $\frac{3}{5}$ d) none of these

7. The equation $x^2 + 3y^2 - 9x + 2y + 1 = 0$ represents **[1]**

a) a parabola b) a circle

c) a hyperbola d) an ellipse

8. The vertex of the parabola $y^2 = 4\ a(x - a)$ is **[1]**

a) (0, a) b) (a, 0)

c) (0, 0) d) none of these

9. The equation of the directrix of the parabola $x^2 = -4\ a\ y$ is **[1]**

a) y – a = 0 b) x – a = 0

c) x + a = 0 d) y + a = 0

OR

The two parabolas $x^2 = 4y$ and $y^2 = 4x$ meet in two distinct points. One of these is the origin and the other is

a) none of these b) (2, 2)

c) (1, 1) d) (4, 4)

Section B

10. If p is a real number and the middle term in the expansion of $\left(\frac{p}{2} + 2\right)^8$ is 1120, then find the value of p. **[2]**

11. Find the angle between the lines joining the points (0, 0), (2, 3) and the points (2, - 2), (3, 5). **[2]**

OR

Find the distance between parallel lines l(x + y) + h = 0 and l(x + y) - r = 0.

12. Find the equation of ellipse having Major axis on the x-axis and passes through the points (4, 3) and (6, 2) **[2]**

Section C

13. If the coefficients of 2nd, 3rd and 4th terms in expansion of $(1 + x)^n$ are in AP, then find the value of n. **[4]**

14. If a $\left(\frac{1}{b} + \frac{1}{c}\right), b\left(\frac{1}{c} + \frac{1}{a}\right), c\left(\frac{1}{a} + \frac{1}{b}\right)$ are in A. P. prove that a, b, c are in A. P. **[4]**

15. Find the equation of ellipse which has **[4]**

Vertices (± 6, 0), foci (±4, 0)

OR

Find the equation of the circle with centre $\left(\frac{1}{2}, \frac{1}{4}\right)$ and radius $\frac{1}{12}$.

Section D

16. The ratio of A M and G. M of two positive no. a and b is m : n show that **[6]**

$a : b = \left(m + \sqrt{m^2 - n^2}\right) : \left(m - \sqrt{m^2 - n^2}\right)$.

OR

Find the sum to n terms of the series. 3, 15, 35, 63, ...

17. Transform the equation of the line 3x + 2y - 7 = 0 to **[6]**

i. slope intercept form and also find the slope and y-intercept

ii. intercept form and also find the intercepts on the coordinate axes.

iii. normal form and also find the inclination of the perpendicular segment from the origin on the line with the axis and its length.

Atomic Energy Central School No 4

Rawatbhata

CLASS 11 - BIOLOGY

Unit Test II (2019-20)

Time Allowed: 1 hour and 30 minutes **Maximum Marks: 35**

Section A

1. Transport over longer distances proceeds through the vascular system **[1]**

   a) Diffusion b) Translocation

   c) Osmosis d) Transpiration

2. The deficiency symptoms in nitrogen,potassium, magnesium is clearly visible first in **[1]**

   a) buds b) older leaves

   c) stem d) senescent younger leaves

3. Which one is not an internal factor that influence rate of photosynthesis? **[1]**

   a) Hormones b) Mesophyll cells

   c) Carbondioxide d) Chlorophyll

4. Two molecules of pyruvate are completely degraded in Krebs cycle to form **[1]**

   a) $2ATP$, $8NADH_2$ and $2FADH_2$ b) $2ATP$, $6NADH_2$ and $2FADH_2$

   c) $8ATP$, $8NADH_2$ and $2FADH_2$ d) $4ATP$, $12\ NADH_2$ and $4FADH_2$

5. During anaerobic respiration less energy is produced than aerobic respiration because **[1]**

   a) Incomplete oxidation of glucose takes place b) It takes place in inert medium

   c) Glucose is not available d) It takes place is micrograms

Section B

6. What is mass flow hypothesis? **[2]**
7. Give a diagram showing the movement of water in leaves. **[2]**
8. What is the importance of phosphorus for plants? **[2]**
9. What is the significance of splitting of water, during photosynthesis? **[2]**
10. What are the main steps of aerobic respiration? **[2]**

    OR

    How glycolysis takes place in anaerobic environment?

Section C

11. Differentiate between the following: Guttation and Transpiration. **[3]**

    OR

    Briefly describe water potential. What are the factors affecting it?

12. What are the steps involved in the formation of a root nodule? **[3]**
13. Why is that in certain plants deficiency symptoms appear first in younger parts of the plant **[3]**

while in others they do so in mature organs?

14. RuBisCO is an enzyme that acts both as a carboxylase and oxygenase. Why do you think RuBisCO carries out more carboxylation in CO_2 plants? **[3]**

15. Give a brief account of light reaction. **[3]**

Section D

16. Explain ETS. **[5]**

OR

Explain various steps involved in cellular respiration.

Atomic Energy Central School No 4

Rawatbhata

CLASS 11 - PHYSICAL EDUCATION

Unit Test II (2019-20)

Time Allowed: 1 hour and 30 minutes **Maximum Marks: 35**

Section A

1. What are the physical activities? **[1]**
2. Enlist any two qualities required for mountaineering. **[1]**
3. Write the types of trekking. **[1]**
4. What do you mean by somato types? **[1]**
5. What do you mean by Measurement? **[1]**
6. What do you mean by a test? **[1]**
7. What do you mean by an Evaluation? **[1]**
8. What is heart rate? **[1]**
9. What is a force? **[1]**
10. What do you mean by axial skeleton system? **[1]**

Section B

11. What is trekking and explain the types of trekking. **[3]**

OR

Explain the safety measures during surfing.

12. Elaborate the procedure of measurement of leg length and upper length. **[3]**
13. Calculate the BMI of a male person whose weight is 80kg and height is 1.6m. Also state the category in which he falls. **[3]**
14. What are the functions of respiratory system? **[3]**
15. Explain dynamic equilibrium. **[3]**

Section C

16. Explain in detail the importance of Test and Measurement and Evaluation in the field of games and sports? **[5]**

OR

Explain any four importance of test, measurement & evaluation in detail?

17. Elucidate the importance of biomechanics in sports. **[5]**

OR

Write in detail about classification of bones.

परमाणु ऊर्जा केंद्रीय विद्यालय -4 रावटभाटा

इकाई परीक्षा - II 2019-20

कक्षा -11 विषय -हिन्दी पूर्णांक -40 समय -1 घण्टा 30 मि०

खण्ड -क

प्रश्न-1 निम्नलिखित गदयांश को ध्यानपूर्वक पढिए और पूछे गए प्रश्नों के उत्तर लिखिए - 2+2+1=5

विश्व प्रसिद्ध दार्शनिक सुकरात शक्ल से अत्यंत कुरूप थे । एक दिन एकाकी बैठे वह दर्पण हाथ में लिए अपना मुंह देख रहे थे , तभी उनका एक प्रिय शिष्य कमरे में आया और सुकरात को दर्पण देखता पाकर बहुत आश्चर्यचकित हुआ । वह कुछ बोला नहीं मात्र मुस्कराने लगा । विद्वान सुकरात ने शिष्य की मुस्कराहट देखकर सब बात समझ ली । कुछ क्षणों के पश्चात वे बोले , " मैं तुम्हारी मुस्कुराहट का कारण जान गया हूं । संभवत:तुम यह सोच रहे हो कि मुझ जैसा असुंदर व्यक्ति आखिर शीशा क्यों देख रहा है ?" शिष्य मौन रहा । उसकी चोरी पकड़ी गयी थी । उसका सिर लज्जा से झुक गया । वह धरती की ओर देखता खड़ा रहा । सुकरात ने पुन: बोलना प्रारम्भ किया , ' वत्स ,शायद ,तुम नहीं जानते कि मैं यह शीशा क्यों देख रहा हूं। "

'नहीं गुरुजी' शिष्य ने कहा । मैं कुरूप हूं , इसलिए प्रतिदिन शीशा देखता हूं । शीशा देखकर मुझे अपने कुरूपता का भान हो जाता है । मैं अपने रूप को जानता हूं इसलिए मैं प्रतिदिन प्रयत्न करता हूं कि ऐसे अच्छे काम करूं जिनसे मेरी यह कुरूपता ढक जाय । " शिष्य को यह बडा शिक्षाप्रद लगा । किन्तु उसने स्वाभाविक शंका प्रकट की , तब तो गुरुजी ,सुंदर मनुष्य को कदापि शीशा नहीं देखना चाहिए ।

"ऐसी बात नहीं । सुकरात ने समझाते हुए ,उन्हें भी शीशा अवश्य देखना चाहिए । इसलिए ताकि उन्हें स्मरण रहे कि वे जीतने सुंदर हैं , उतने ही सुंदर काम करें , अन्यथा बुरे काम उनके सुंदरता को भी कुरुप बना देगें। " शिष्य को गुरू की बात का रहस्य मालूम हो गया । वह गुरु के सम्मुख श्रद्धा से नतमस्तक हो गया ।

(क) शिष्य ने क्या देखा और उसने क्या किया ?

(ख) सुकरात ने शिष्य से क्या कहा और शिष्य ने क्या किया ?

(ग) सुकरात ने प्रतिदिन शीशा देखने का क्या कारण बताया ?

प्रश्न -2 निम्नलिखित कव्यांश को पढ़ कर पूछे गए प्रश्नों के उत्तर लिखिए - 1+1+1=3

मृदु मिट्टी के हैं बने हुए ,
मधु घट फूटा ही करते हैं ,
लघु जीवन ले कर आए हैं ,
प्याले टूटा ही करते हैं ,
फिर भी मदिरालय के अंदर
मधु के घट हैं मधु प्याले हैं ,
जो मादकता के मारे हैं ,
वे मधु लूटा ही करते हैं ,

(क) मृदु मिट्टी के बने हुए का क्या अर्थ है ?

(ख) लघु जीवन किस - किस का होता है ?

(ग) मादकता के मारे का यहां क्या आशय है ?

खण्ड -ख

प्रश्न -3 निम्नलिखित मे से किसी एक का दृश्य लेखन कीजिए - 5

(क) वर्ल्ड कप मैच का आंखों देखा वर्णन

(ख) भयंकर बाढ़ का दृश्य

(ग) किसी प्रदर्शनी का आंखों देखा वर्णन

प्रश्न -4 दैनिक समाचार पत्र के संपादक को एक पत्र लिखिए जिसमें अपराधी - तत्व के राजनीति में रहने से लोकतंत्र के लिए संभावित खतरों के प्रति चिन्ता प्रकट की गयी हो 5

अथवा

गुवाहाटी नगर के स्वास्थ्य अधिकारी को पत्र लिखकर उनसे अपने मुहल्ले /अपने क्षेत्र की सफाई कराने का अनुरोध कीजिए ।

प्रश्न- 5 किन्ही दो प्रश्नों के उत्तर लिखिए - 1+1=2

(क) फीचर से क्या आशय है ?

(ख) पूर्वस्वातंत्र्य सुप्रसिदध दो पत्रकारों का नाम लिखिए ।

(ग) पत्रकारिता में बीट किसे कहते हैं ?

खण्ड -ग

प्रश्न -6 निम्नलिखित में से किन्ही दो प्रश्नों के उत्तर लिखिए - 2+2=4

(क)कवि ने चम्पा की किन विशेषताओं का उल्लेख किया है ? (चम्पा काले-काले के आधार पर)

(ख) अपना घर से क्या तात्पर्य है इसे भूलने की बात क्यों कही गई है ?(हे मेरे जूही के फूल)

(ग) लक्ष्य प्राप्ति मे इंद्रिया बाधक होती है - इसके संदर्भ मे अपने तर्क दीजिए । (हे भूख मत मचल)

प्रश्न -7 निम्नलिखित गदयांश को पढ़ कर पूछे गए प्रश्नों के उत्तर दीजिए - 2+2+2=6

शाम के पांच बजे स्वयं सुपरिटेंडेंट कवि की फाइल लेकर उसके पास आया , सुनते हो ! आते ही वह खुशी से फाइल को हिलाते हुए चिल्लाया ,प्रधानमंत्री ने इस पेड़ को काटने का हुक्म दे दिया ,और इस घटना की सारी ज़िम्मेदारी अपने सिर ले ली है । कल यह पेड़ काट दिया जाएगा और तुम इस संकट से छुटकारा हासिल कर लोगे । सुनते हो ? आज तुम्हारी फाइल पूर्ण हो गई ।

मगर कवि का हाथ ठंढा था ,आंखों की पुतलियां निर्जीव और चींटियों की एक लंबी पांत उसके मुंह में जा रही थी ।

(क) पाठ तथा उसके लेखक का नाम लिखिए ।

(ख) इस गदयांश में सरकार की किस नीति पर व्यंग किया गया है ?

(ग) आपकी दृष्टि में कवि किसलिए ठंडा पड़ गया ?

प्रश्न -8 निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर दीजिए । 2+2=4

(क) इतिहास में स्पीति का वर्णन नहीं मिलता । क्यों ?

(ख) स्त्री के चरित्र की बनी बनाई धारणा से रजनी का चेहरा किन मायनों में अलग है ?

(ग) कृषि विभाग वालों ने मामले को हांर्टीकल्चर विभाग को सौपने के पीछे क्या तर्क दिया ?

प्रश्न 9 निम्नलिखित प्रश्नों मे से किसी एक के उत्तर लिखिए - 4

(क) अपने परिवार से तातुश के घर तक के सफर में बेबी के सामने रिश्तों की कौन सी सच्चाई उजागर होती है ? (आलो आंधारि)

अथवा

(ख) बेबी की जिंदगी में तातुश का परिवार न आया होता तो उसका जीवन कैसा होता ? कल्पना करें और लिखें ।

Atomic Energy Central School No-4, Rawatbhata

Class: XI Unit Test – 2 (2019-20) Subject: COMPUTER SCIENCE

Time allowed: 1:30 Hours Maximum Marks: 35

1. Name the core data types of Python? [1]
   OR
   What are augmented assignment operators? Give example.
2. Is Python capable to store complex numbers? If yes then give example. [1]
   OR
   What do you understand by mutable and immutable data types? Give examples.
3. Differentiate between the built in functions type() and id()? [1]
4. Write a short note on logical operators? [2]
5. Give result of following operators' expression: [2]
   i) -5**2 ii) 6.5//2 iii) 9%4 iv) 1 = = True
6. What will be the output of following expression: [1]
   (5<10) and (10<5) or (3<18) and not(8<18)
7. Write python expressions for the following: [2]
   i) $\sqrt{(a^2 + b^2 + c^2)}$ ii) $2r - xe^{2y}$ iii) (cos x /tan x) iv) $\log_e 2x + x^y$
8. Display the possible values generated by the following statement: [1]
   >>>random.randrange(10,22,3)
9. Which header file needed to import by the following functions: i) mean() ii) ceil() [1]
10. Draw the flow charts to Calculate the discount on the basis of the purchase amount entered:
    If PA>=5000 then disc is 7.5% [3]
    If PA >=10000 then disc is 10%
    If PA <5000 then disc is 0
11. Identify and correct the following code:
    1) C=10 [1]
    ```
    while c>0:
        print c
       c – 1
    ```
    2) If n==0 [2]
    ```
       print "zero"
    elif : n==1
        print "one"
    elif n==2:
       print "two"
    else n===3:
       print "three"
    ```
12. What is the use of loop else statement? Will the loop runs successfully if it is not given? [1]
    OR
    Draw a for loop which runs 15 times
13. Explain the string concatenation and replication operator with example? [2]
    OR
    Define the functions find() and isalnum() with strings?
14. Predict the output: [2]
    String="Wonderful"
    i) print String[-7 : -3]
    ii) print String[5:]
    iii) print String[1:6:2]
    iv) print String[6:20]
15. Write python programs for the following:
    a) Enter three numbers and find the greatest one? [2]
    b) Print the series: 1 4 7 10…..40 [3]
    c) Print the pattern: [3]
    ```
    1
    2 2
    3 3 3
    4 4 4 4
    5 5 5 5 5
    ```
    d) Enter a string and capitalizes the every letter at even position, for example: [4]
    String is: alphanumeric then o/p is: AlPhAnUmErIc
    OR
    Enter a string and check whether it is a palindrome string or not?

Solution

Class 11 - Physics

Unit Test II (2018-19)

Section A

1. **(c)** $\frac{1}{3}\ \mathrm{ML}^2$

   Explanation: Using theorem of parallel axis, the axis is shifted by L/2 distance from centre of Mass where the Moment of Inertia is $ML^2/12$, thus the moment of inertia of a thin rod about an axis passing through one end and perpendicular to its length is $ML^2/12 + ML^2/4 = \frac{1}{3}\ \mathrm{ML}^2$

2. **(d)** 1.0

   Explanation: Moment of inertia

   $I = mk^2$

   $m = 2Kg$

   $k = 0.5m$

   $I = 2 \times 0.5 \times 0.5 = 0.5Kgm^2$

   angular momentum

   $L = I\omega$

   $\omega = 2rad/s$

   $L = 0.5 \times 2 = 1.0Kgm^2/s$

3. **(d)** 9.16×10^{13} N

   Explanation:

   $\mathrm{W} = 675\ \mathrm{N}$

   $\text{Radius of Neutron star} = \dfrac{20}{2} = 10\ \mathrm{km} = 10000\ \mathrm{m}$

   $\text{We need to find g on the Neutron star, so:}$

   $\mathrm{g_{neutron}} = \dfrac{\mathrm{GM}}{r^2}$

   $\mathrm{M} = 1.99 \times 10^{30}\mathrm{kg}$

   $r = 10000\ \mathrm{m}$

   $\Rightarrow \mathrm{g_{neutron}} = \dfrac{6.67 \times 10^{-11} \times 1.99 \times 10^{30}}{(10000)^2}$

   $\Rightarrow \mathrm{g_{neutron}} = 667 \times 199 \times 10^7$

   $\Rightarrow \mathrm{g_{neutron}} = 132733 \times 10^7$

   $\text{Weight on earth} = 675\ \mathrm{N}$

   $\Rightarrow mg_{earth} = 675\ \mathrm{N}\ (\text{Given})$

   $\Rightarrow m = \dfrac{675}{9.8} = 68.87$

   $\text{Weight on saturn} = \mathrm{m} \times \mathrm{g}_{neutron}$

   $= 68.87 \times 132733 \times 10^7$

   $= 9.16 \times 10^{13}\ \mathrm{N}$

4. **(d)** 1.19×10^{10}J

   Explanation: Period of rocket in geosynchronous orbit is same as that of the earth:

   That is T = 1day = 24hours = $24 \times 60 \times 60$ sec = 8.64×10^4 s

   From Keplers 3rd law

   $T^2 = K_E r^3_{GS}$

Where $K_E = \frac{4\pi^2}{GM_E}$ = 9.89 × $10^{-14} s^2/m^3$

Therefore the geosynchronus radius is

$$r_{GS} = \sqrt[3]{\frac{T^2}{K_E}} = \sqrt[3]{\frac{\left(8.64\times10^4\right)^2}{9.89\times10^{-14}}} = 4.23 \times 10^7 m$$

Because the initial position before the boost is 280 km = 2.8 × 10^5 m

and the radius of the Earth is 6,370 km = 6.37 × 10^6 m

Therefore $r_i = R_E$ + 2.80 × 10^5 m = 6.65 × 10^6 m

The total energy needed to boost the satellite at the geosynchronus radius is the difference of total energy before and after the boost

$$E = -\frac{GM_E m_s}{2}\left(\frac{1}{r_{GS}} - \frac{1}{r_i}\right)$$

$$= -\frac{6.67\times10^{-11}\times5.98\times10^{24}\times470}{2}\left(\frac{1}{4.23\times10^7} - \frac{1}{6.65\times10^6}\right)$$ = 1.19 × 10^{10}J

5. **(b)** it gets permanently deformed on application of force i.e. shape and size do not change on removal of force

   Explanation: When external force is applied on plastic bodies, the intermolecular forces does not regain their original equilibrium postions and the body is permanently distorted e.g. Putty and mud are close to ideal plastics.

6. **(d)** 0.14×10^{-2}

   Explanation:
   $given\ for\ copper$
   $cross\ section = 15.2mm \times 19.1mm$
   $thus\ cross\ sectional\ area(A) = 15.2 \times 19.1\ mm^2\ = 2.9 \times 10^{-4}\ m^2$
   $restoring\ force\ tension(T) = 44500\ N$
   $young\ modulus\ of\ copper\ (y) = 11 \times 10^{10}\ pa$
   $also\ y = \frac{stress}{strain} \Rightarrow strain = \frac{stress}{y}$
   $strain = \frac{44500}{2.9\times10^{-4}\times11\times10^{10}}$
   $strain = 0.1394 \times 10^{-2} \approx 0.14 \times 10^{-2}$

7. It plays the same role in rotatory motion as the mass does in translatory motion. It means moment of inertia is the property of rotating body due to which it opposes the change in its state of rotational motion.
8. Equilibirium means if the state of motion of the body does not change i.e. it has no linear and angular acceleration. Hence if a body has net zero force and torque it will be in equilibrium. For eg. a car moving on a straight road at a constant speed.
9. $\because F = \frac{GMm}{R^2}; F\ \propto\ m$ but $g = \frac{Gm}{R^2}$ and does not depend on 'm' hence the bodies fall with same 'g'.
10. In fluids the coefficient of viscosity depends upon Rate of Shear Strain.

Section B

11. Given, $r = 0.53\text{Å} = 0.53 \times 10^{-10} m$
    $m = 9 \times 10^{-31} kg,\ \ v = 2.2 \times 10^6 m/s$
    θ = 30°, L = ?
    L = mvrsinθ
    = 9 × 10^{-31} × 2.2 × 10^6 × 0.53 × 10^{-10} × sin30°
    = 5.247×10^{-3} kg-m^2/s

    OR

    If ice on poles melts, then the molten ice from poles goes into ocean and which results in the mass going away from axis of rotation. Therefore, moment of inertia of earth increases which results in the decrease of angular velocity (ω) to conserve angular momentum, So, time period of rotation increases ($T = 2\pi/\omega$). So, net effect of global warming is increasing in the duration of day.
12. Period of revolution of a satellite, T is the time taken by the satellite to complete one revolution around the earth.

$\therefore T = \frac{\text{Circumference of circular orbit}}{\text{Orbital velocity}}$

or $T = \frac{2\pi r}{v_o}$

or $T = \frac{2\pi(R+h)}{v_o}$ [$\because$ r = R + h]

or $T = 2\pi(R+h)\sqrt{\frac{R+h}{GM}}$ $\left[\because v_o = \sqrt{\frac{GM}{R+h}}\right]$

or $T = 2\pi\sqrt{\frac{(R+h)^3}{GM}}$

Also, $T = 2\pi\sqrt{\frac{(R+h)^2(R+h)}{GM}}$

or $T = 2\pi\sqrt{\frac{(R+h)^3}{gR^2}}$

$\therefore gR^3 = GM$

$\therefore T = 2\pi\sqrt{\frac{(R+h)^3}{gR^2}}$

OR

Orbital velocity of a satellite is

$v = \sqrt{\frac{GM}{r}}$

Where M is the crass of earth

Time period of satellite $T = \frac{2\pi r}{v}$

$T = \sqrt{\frac{GM}{r}}$

$\mathrm{T} = 2\pi\sqrt{\frac{r^3}{GM}}$

$\mathrm{T}^2 = \frac{4\pi^2 r^3}{GM}$

$\frac{4\pi^2}{GM} = \mathrm{R}(\text{ constant })$

Thus $\mathrm{T}^2 \propto \mathrm{r}^3$

Hence proved.

13. Modulus of elasticity is defined as ratio of the stress to the corresponding strain produced, within the elastic limit.

    E (Modulus of elasticity) $= \frac{\text{Stress}}{\text{Strain}}$

    Types of Modulus of elasticity:-

    i. Young's Modulus $= \frac{\text{Normal Stress}}{\text{Longitudinal Strain}}$

    ii. Bulk Modulus $= \frac{\text{Normal Stress}}{\text{Volunetric Strain}}$

    iii. Modulus of Rigidity $= \frac{\text{Tangential Stress}}{\text{Shearing Strain}}$

Section C

14. i. Torque, $\tau = FR = 25 \times 0.20 = 5Nm$

    [$\because R = 20cm = 0.2m$]

    Moment of inertia,

    I = $\frac{MR^2}{2}$ = $\frac{20\times(0.2)^2}{2}$ = 0.4kg-m^2

    Angular acceleration, $\alpha = \frac{\tau}{I}$ = $\frac{5}{0.4} = 12.5rad/s^2$

    ii. Work done by the pull, $w = F \times s = 25 \times 2 = 50J$

    iii. KE = $\frac{1}{2}I\omega^2$

    $\omega^2 = \omega_0^2 + 2\,\alpha\,\theta = 0 + 2 \times 12.5 \times 10$

    [$\because \omega_0 = 0, \theta = \frac{2}{0.2} = 10$rad]

    $\therefore KE = \frac{1}{2} \times 0.4 \times 250 = 50J$

    iv. From parts (ii) and (iii),

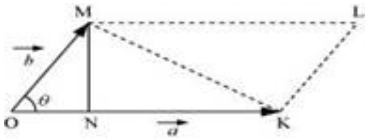
    $KE = W$

    $\therefore$ No loss of energy due to friction.

OR

To calculate the area of the parallogram using vector method ,we will proceed in the following manner.

Let there are two vectors $\overrightarrow{OK} = |\vec{a}|$ and $\overrightarrow{OM} = |\vec{b}|$, inclined at an angle θ, as shown in the following figure for which we have to find the area of corresponding parallogram OKLMO -



In ΔOMN, we can write the relation:

$\sin\theta = \frac{MN}{OM} = \frac{MN}{|\vec{b}|}$

$MN = |\vec{b}|\sin\theta$

$|\vec{a} \times \vec{a}| = |\vec{a}||\vec{b}|\sin\theta$

$= OK \cdot MN \times \frac{2}{2}$

= 2 $\times$ Area of ΔOMK

$\therefore$ Area of ΔOMK $= \frac{1}{2}|\vec{a} \times \vec{b}|$

Thus it can be proved that area of parallelogram is half the magnitude of cross product of two vectors both forming separate sides of the parallogram.OKLMO as shown in the figure.

Above problem can be Proved in such manner.

15. Mass of the earth, $M = 6.0 \times 10^{24} kg, m = 67kg$

$G = 6.67 \times 10^{-11} Nm^2 kg^{-2}$

Gravitational potential, V = - $\frac{GM}{R}$

= - $\frac{6.67 \times 10^{-11} \times 6 \times 10^{24}}{6.6 \times 10^{10}}$

$V = -6.1 \times 10^3 Jkg^{-1}$

16. i. The resolved part of F along the normal is the tensile force on this plane and the resolved part parallel to the plane is the shearing force on the plane.

$\because$ Area of MO plane section $= Asec\theta$

$Tensile\ stress = \frac{\text{Force}}{\text{Area}}$ = $\frac{F\cos\theta}{A\sec\theta}$

= $\frac{F}{A}\cos^2\theta$ [$\because sec\theta$ = $\frac{1}{\cos\theta}$]

ii. Shearing stress applied on the top face

So,$F = Fsin\theta$

$Shearing\ stress = \frac{\text{Force}}{\text{Area}} = \frac{F\sin\theta}{A\sec\theta}$

= $\frac{F}{A}\sin\theta\cos\theta$

= $\frac{F}{2A}\sin 2\theta$ [$\because sin2\theta = 2sin\theta cos\theta$]

iii. Tensile stress will be maximum when $cos^2\theta$ is maximum i.e. $cos\theta$is maximum i.e. $cos\theta = 1\ or\ \theta = 0^o$

iv. Shearing stress will be maximum when $sin2\theta$ is maximum i.e. $sin2\theta = 1\ or\ 2\theta = 90^o\ or\ \theta = 45^o$

OR

i. Hooke's law is obeyed up to point A of the stress-strain curve.

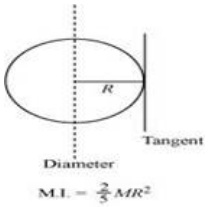
ii. Point B on the curve corresponds to elastic limit and yield point of a given wire.

iii. The region OB on the stress-strain curve represents the elastic region. The region BD on the stress-strain curve represents the plastic region.

iv. When the given wire is loaded up to a stress corresponding to point C on the curve and then unloaded gradually, it does not regain its original configuration even on complete unloading. The material has some strain left (OO'), which is called a permanent set.

Section D

17. a. The moment of inertia (M.I.) of a sphere about its diameter $= \frac{2}{5}MR^2$



Given,

Moment of inertia of the sphere about its diametre = $(\frac{2}{5})mR^2$

Use, parallel axis theorem ,

Moment of inertia of the sphere about tangent = $I + mR^2$

= $(\frac{2}{5})mR^2 + mR^2$

= $(7/5)mR^2$

b. Moment of inertia of disc of mass m and radius R about any of its diametre = $mR^2/4$

Moment of inertia about diametre = Ix = Iy= $(\frac{1}{4})mR^2$

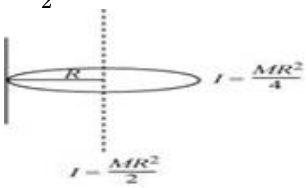
Using , perpendicular axis theorem ,

Iz = Ix + Iy

Where Iz is moment of inertia about perpendicular axis of plane of disc .

Iz = $(\frac{1}{4})mR^2 + (\frac{1}{4})mR^2$

= $(\frac{1}{2})mR^2$



Moment of inertia of disc about passing through a point of its edge

Use , parallel axis theorem,

$I = Iz + mR^2$

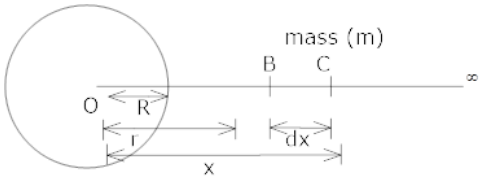
= $(\frac{1}{2})\ mR^2 + mR^2$

= $(\frac{1}{2})mR^2$

OR

as per ncert

18. It is defined as the work done in bringing a body from infinity to that point.



A body of mass (m) lying at a distance x from earth of mass (m). Hence, Gravitational force between the two is $F = \frac{GMm}{x^2}$

Where G is universal gravitational constant

M is mass of the planet and m is a mass of the body to be shifted from infinity to distance r

r is the distance of the body

If the body is displaced through a distance dx then (small amount of work done in bringing an object from C to B)dw = Fdx $= \frac{GMm}{x^2}dx$

Total amount of work done in bringing an object from infinity to r

$\int_{\infty}^{r} \frac{GMm}{x^2}dx$

$w = GMm\int_{\infty}^{r} \frac{1}{x^2}dx$

$w = \mathrm{GMm}\left|\frac{-1}{x}\right|_{\infty}^{r}$

$w = -GMm\left|\frac{1}{r} - \frac{1}{\infty}\right|$

$w = \frac{-GMm}{r}$

This work done is equal to the gravitational potential energy.

i.e.

$w = U_g = \frac{-GMm}{r}$, the negative sign indicates that it is attractive in nature.

OR

as per ncert

Solution

Class 11 - Chemistry

Unit Test II (2018-19)

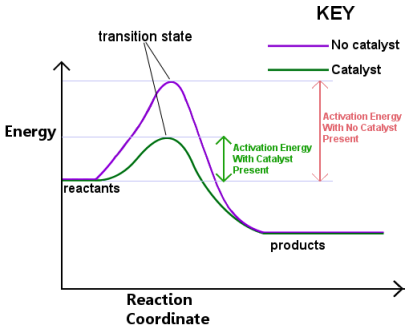
Section A

1. **(b)** -46.2 kJ mol^{-1}
Explanation: Given, $N_2\,(g)\ +\ 3H_2\,(g)\ \rightarrow\ 2NH_3\,(g)\ ;\ \Delta_r H^0 = -92.4 kJ mol^{-1}$.
Chemical reaction for the enthalpy of formation of NH_3 (g) is as follows:
$\frac{1}{2}N_2\ (g)\ +\frac{3}{2}H_2(g)\ \rightarrow NH_3(g)$
$Therefore,\ \triangle_f H^\circ = \frac{-92.4}{2} =\ -46.2\ kJ/mol$

2. **(a)** $\Delta S > 0$
$$\triangle U =\ 0$$
Explanation: For an isolated system, and for a spontaneous process, Total entropy change must be positive.
$$\triangle S = \frac{q_{rev}}{T} = \frac{\triangle H}{T} = \frac{\triangle U\ + p\triangle V}{T} = \frac{0 + p\triangle V}{T}$$
$$i.e.\ T\triangle S > 0$$
Moreover, $Or\quad \triangle S > 0$

3. **(b)** Lewis base
Explanation: Amines behave as lewis base because they have a lp of electrons.

4. **(b)** a catalyst does not change the equilibrium position of a reaction
Explanation: Catalyst provides a low activation energy path to complete the reaction. This affects reactions in forward and backward direction equally. Thus, Catalysts have no effect on the position of equilibrium.



5. **(b)** $K_{a_3} = K_{a_1} \times\ K_{a_2}$
Explanation: The ionization reactions for example for a dibasic acid H_2X are represented by the equations:
$H_2X(aq) \rightleftharpoons H^+(aq) + HX^-(aq)$
$HX^-(aq) \rightleftharpoons H^+(aq) + X^{2-}(aq)$
the corresponding equilibrium constants are given below:$K_{a_1} = \frac{[H^+][HX^-]}{[H_2X]}$and $K_{a_2} = \frac{[H^+][X^{2-}]}{[HX^-]}$
Here, Ka_1 and Ka_2 are called the first and second ionization constants respectively of the acid H_2 X.
$for\ H_2S\ \rightleftharpoons\ 2H^+\ +\ S^{2-}$
$K_{a_3} = \frac{[H^+]^2[X^{2-}]}{[H_2X]}$

It is clear that, $K_{a_1} \times K_{a_2} = \frac{[H^+][HX^-]}{[H_2X]} \times \frac{[H^+][X^{2-}]}{[HX^-]} = \frac{[H^+]^2[X^{2-}]}{[H_2X]} = K_{a_3}$

Therefore, $K_{a_3} = K_{a_1} \times K_{a_2}$

6. **(b)** CrO^-_2 , ClO^-_3 , CrO^{2-}_4 , MnO^-_4

   Explanation: In CrO^-_2 , Cr is in +3 oxidation state

   In ClO^-_3 , Cl is in +5 oxidation state

   In CrO^{2-}_4 , Cr is in +6 oxidation state

   In MnO^-_4 , Mn is in +7 oxidation state

7. Given, At 298 K, $N_2O_4(g) \rightleftharpoons 2NO_2(g)$.
   We know that, $\Delta_r G^\circ = -2.303RT \log K_p$
   According to the question, K_p = 0.98.
   As, K_p < 1, $\Delta_r G^\circ$ will be positive. $[\because \log(0.98) = -0.0087]$
   Hence, the reaction is non-spontaneous.
8. The solutions which resist change in pH on dilution or with the addition of small amounts of acid or alkali are called Buffer solutions.
9. At a given temperature, the product of concentrations of the reaction products raised to the respective stoichiometric coefficient in the balanced chemical equation divided by the product of concentrations of the reactants raised to their individual stoichiometric coefficients has a constant value. This is known as the equilibrium law or law of chemical equilibrium. The mathematical expression for the reaction given below is
   a A + b B ⇌ c C + d D
   $K_c = \frac{[C]^c\ [D]^d}{[A]^a\ [B]^b}$
   where K_c is equilibrium constant and a, b, c, d are stoichiometric coefficients of A, B, C, D respectively.
10. No, it is not considered as a redox reaction because the oxidation number of Cr atom in CrO_4^{2-} and $Cr_2O_7^{2-}$ is the same i.e., +6, therefore, there is no change in the oxidation state of both reactant as well as product, Hence it is not a redox reaction.

Section B

11. As per NCERT

    OR

    Chemical reaction involves the breaking of bonds in reactants as well as formation of new bonds in products. The enthalpy of reaction depends on the values of the heat needed to break the bond formation.
    Therefore,
    Heat of reaction = Heat needed to break the bonds in reactants – Heat liberated to form bonds in products
    ΔH^o = Bond energy of reactants – Bond energy of products.
12. The acid is BF_3 and the base is NH_3. The Lewis theory of acids and bases explains it. The hybridization of B in BF_3 is sp^2 and the hybridization of N in NH_3 is sp^3.
13. a. Let the oxidation number of phosphorus is x and the oxidation number of other species like O-atom is -2 while that of H-atom is +1
    $\overset{x}{H}PO_3^{2-}$
    $+1 + x + (-2) \times 3 = -2$
    $+1 + x - 6 = -2$
    x - 5 = -2
    x = -2 + 5
    x = +3
    Thus, O.S. of phosphorous is +3.
    b. In this also, let the oxidation number of Phosphorous atom is x and the oxidation number of O-atom is -2.
    $\overset{x}{P}O_4^{3-}$

$x + (-2) \times 4 = -3$

x - 8 = -3

x = -3 + 8

x = +5

Thus, O.S. of phosphorous in this ion is +5.

Section C

14. According to the question, $\Delta U^\circ = -10.5$ kJ and $\Delta S^\circ = -44.1$ JK^{-1}, R = 8.314 × 10^{-3} kJ mol^{-1}, T = 298 K.

Reaction:

$2A(g) + B(g) \longrightarrow 2D(g)$

$\Delta n_g = n_p - n_r = 2 - 3 = -1$

We know that, $\Delta H^\circ = \Delta U^\circ + \Delta n_g RT$

$\Delta H^\circ = -10.5$ + (- 1 × 8.314 × 10^{-3} × 298)

= - 12.977 kJ mol^{-1}

Now, $\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$

$\Delta G^\circ = -12.977$ - (298 × - 44.1 × 10^{-3})

= 0.165 kJ mol^{-1}

The reaction will not occur spontaneously because ΔG° is positive.

15. $CaSO_4(s) \rightleftharpoons Ca^2(aq) + SO_4^{2-}(aq)$; K_{sp} = $9.1 \times 10^{-6}\ M$

If s is the solubility of $CaSO_4$ in moles L^{-1}, the

$\sqrt{K_{sp}} = \sqrt{9.1 \times 10^{-6}\ M} = [Ca^{2+}][SO_4^{2-}] = s.s = s^2$

$s = 3.017 \times 10^{-3}$

or $CaSO_4$ solublity $= = 3.02 \times 10^{-3} \times 136 gL^{-1} = 0.411 gL^{-1}$ (molar mass of $CaSO_4$ = 136 g mol^{-1})

Thus, for dissolving 0.411 g, water required = 1L

$\therefore$ For dissolving 1g, water required $= \frac{1}{0.411} L = 2.43L$

OR

	$C_6H_5OH \rightleftharpoons C_6H_5O^- + H^+$		
Initial	0.05 M		
After disso.	0.05 − x	x	x

Here, $K_a = \frac{[C_6H_5O^-][H^+]}{[C_6H_5OH]}$

$\therefore K_a = \frac{x \times x}{0.05 - x} = 1.0 \times 10^{-10}$ (given) or

or $x^2 = 5 \times 10^{-12}$ or x $= 2.2 \times 10^{-6} M$

In presence of 0.01 C_6H_5ONa, suppose y is the amount of phenol dissociated, then at equilibrium

$[C_6H_5OH] = 0.05 - y \simeq 0.05$

$[C_6H_5O^-] = 0.01 + y \simeq 0.01\ M, [H^+] = y\ M$

$\therefore K_a = \frac{(0.01)(y)}{0.05} = 1.0 \times 10^{-10}$ (given) or $y = 5 \times 10^{-10}$

$\therefore \alpha = \frac{y}{c} = \frac{5 \times 10^{-10}}{5 \times 10^{-2}} = 10^{-8}$

16. i. F.

Fluorine being the most electronegative element shows only a -ve oxidation state of -1.

ii. Cs.

Alkali metals because of the presence of a single electron in the valence shell, exhibit an oxidation state of + 1 only.

iii. I

Due to the presence of d -orbitals and seven electrons in the valence shell of iodine (I), it shows an oxidation state of

a. -1, in compounds of iodine with more electropositive elements with an oxidation state of +1 (such as H, Na, K Ca, etc.)
b. positive oxidation states of +2, +5 +7 in its compounds with more electronegative elements (such as i.e., O, F, etc.).

c. Ne

Explanation:

It is an inert gas with high ionization enthalpy and high positive electron gain enthalpy. Hence, it exhibits neither +ve nor -ve oxidation states in its compounds.

Section D

17. According to the question, the standard Gibbs energy change for the reaction $\mathrm{N_2}(g) + 3\mathrm{H_2}(g) \rightleftharpoons 2\mathrm{NH_3}(g)$ is - 33.2 kJ mol^{-1}, T = 298 K.

    i. We know that, log K_1 = - $\frac{\Delta G}{2.303RT}$

    log K_1 = - $\frac{-33.2\times10^3}{2.303\times(8.314)\times(298)}$

    log K_1 = 5.81

    $\Rightarrow K_1 = 6.58 \times 10^5$

    ii. Given reaction:

    $\frac{1}{2}\mathrm{N_2}(g) + \frac{3}{2}\mathrm{H_2}(g) \rightleftharpoons \mathrm{NH_3}(g)$

    $K_2 = \sqrt{K}_1$

    = 811.17

    iii. Given reaction:

    $\mathrm{NH_3}(g) \rightleftharpoons \frac{1}{2}\mathrm{N_2}(g) + \frac{3}{2}\mathrm{H_2}(g)$

    $K_3 = \frac{1}{K_2}$

    = 1.23 $\times$ 10^{-3}

    OR

    a. Molar conc. of TlOH $= \frac{2g}{(204+16+1)g\ mol^{-1}} \times \frac{1}{2L} = 4.52 \times 10^{-3} M$

    $[OH^-] = [TlOH] = 4.52 \times 10^{-3}\ M$

    $[H^+] = 10^{-14}/(4.52 \times 10^{-3}) = 2.21 \times 10^{-12} M$

    $\therefore pH = -\log(2.21 \times 10^{-12})$ = 12 - (0.3424) = 11.66

    b. Molar conc. of $Ca(OH)_2 = \frac{0.3g}{(40+34)g\ mol^{-1}} \times \frac{1}{0.5L} = 8.11 \times 10^{-3} M$

    $Ca(OH)_2 \rightarrow Ca^2 + 2OH^-$

    [OH$^-$] = 2[Ca(OH)$_2$] = $2 \times (8.11 \times 10^{-3}) M = 16.22 \times 10^{-3} M$

    $pOH = -\log(16.22 \times 10^{-3}) = 3 - 1.2101 = 1.79$

    pH = 14 - 1.79 = 12.21

    c. Molar conc. of NaOH $= \frac{0.3g}{40g\ mol^{-1}} \times \frac{1}{0.2L} = 0.75 \times 10^{-2} M$

    $[OH^-] = 3.75 \times 10^{-2} M$

    $pOH = -\log(3.75 \times 10^{-2})$ = 2 - 0.0574 = 1.43

    pH = 14 - 1.43 = 12.57

    d. $M_1V_1 = M_2V_2 \therefore 13.6M \times 1mL = M_2 \times 1000mL \therefore M_2 = 1.36 \times 10^{-2} M$

    $[H^+] = [HCl] = 1.36 \times 10^{-2} M, pH = -\log(1.36 \times 10^{-2})$ = 2 - 0.1335 = 1.87

18. We have $\mathrm{N_2(g)} + 3\mathrm{H_2(g)} \rightleftharpoons 2\mathrm{NH_3(g)}$, ΔH= -92.38 kJ mol^{-1} .

    Hence in accordance with Le Chatelier's principle, raising the temperature will shift the equilibrium to the backward direction and decreases the equilibrium concentration of ammonia. Similarly, an increase in pressure shifts the equilibrium in the forward direction. In other words, low temperature and high pressure are favorable for high yield of ammonia. Hence for better yield of ammonia, an optimum condition of temperature and pressure of 500^{o}C and 200 atm respectively is used in the presence of suitable catalysts. There will be no change in equilibria on the addition of argon (Ar) at constant volume to the above mixture at equilibrium because the addition of Ar at constant volume doesn't change the partial pressure of the substances involved in the reaction.

    OR

    Step 1:

    The two half-reactions involved in the given reaction are:

Oxidation half-reaction: $\overset{-1}{\mathrm{I}}(\mathrm{aq}) \rightarrow I_2^0(\mathrm{s})$

Reduction half-reaction: $\mathrm{Mn}\overset{+7}{\mathrm{O}}_4^-(\mathrm{aq}) \rightarrow \mathrm{MnO}_2^{+4}(\mathrm{aq})$

Step 2:

Balancing I in the oxidation half-reaction, we have:

$2I^-_{(aq)} \longrightarrow I_{2(s)}$

Now, to balance the charge, we add 2 e^- to the RHS of the reaction.

$2I^-_{(aq)} \longrightarrow I_{2(s)} + 2e^-$

Step 3:

In the reduction half-reaction, the oxidation state of Mn has reduced from +7 to +4. Thus, 3 electrons are added to the LHS of the reaction.

$MnO^-_{4(aq)} + 3e^- \longrightarrow MnO_{2(aq)}$

Now, to balance the charge, we add 4 OH^- ions to the RHS of the reaction as the reaction is taking place in a basic medium.

$MnO^-_{4(aq)} + 3e^- \longrightarrow MnO_{2(aq)} + 4OH^-$

Step 4:

In this equation, there are 6 O atoms on the RHS and 4 O atoms on the LHS. Therefore, two water molecules are added to the LHS.

$MnO^-_{4(aq)} + 2H_2O + 3e^- \longrightarrow MnO_{2(aq)} + 4OH^-$

Step 5:

Equalising the number of electrons by multiplying the oxidation half reaction by 3 and the reduction half reaction by 2, we have:

$6I^-_{(aq)} \longrightarrow 3I_{2(s)} + 2e^-$

$2MnO^-_{4(aq)} + 4H_2O + 6e^- \longrightarrow 2MnO_{2(s)} + 8OH^-_{(aq)}$

Step 6:

Adding the two half reactions, we have the net balanced redox reaction as:

$6I^-_{(aq)} + 2MnO^-_{4(aq)} + 4H_2O_{(l)} \longrightarrow 3I2(s) + 2MnO_{2(s)} + 8OH^-_{(aq)}$

Solution

Class 11 - Mathematics

Unit Test-II (2019-20)

Section A

1. **(d)** 5^n

Explanation: $\sum_{r=0}^{n} 4^r.^nC_r = 4^0.^nC_0 + 4^1.^nC_1 + 4^2.^nC_2 + \ldots\ldots + 4^n.^nC_n$

$= 1 + 4.^nC_1 + 4^2.^nC_2 + \ldots\ldots + 4^n.^nC_n$

$= (1+4)^n = 5^n$

2. **(c)** 36

Explanation:

$(1-x)^4(1+x)^9 = \left({}^4C_0 + {}^4C_1(-x) + {}^4C_2(-x)^2 + {}^4C_3(-x)^3 + {}^4C_4(-x)^4\right)\left({}^9C_0 + {}^9C_1(x) + {}^9C_2(x)^2 + {}^9C_3(x)^3 + {}^9C_4(x)^4 + {}^9C_5\right.$

$= \left(1 - {}^4C_1 x + {}^4C_2 x^2 - {}^4C_3 x^3 + x^4\right)\left(1 + {}^9C_1 x + {}^9C_2 x^2 + {}^9C_3 x^3 + {}^9C_4 x^4 + {}^9C_5 x^5 + {}^9C_6 x^6 + {}^9C_7 x^7 + {}^9C_8 x^8 + x^9\right)$

we have the sum of the terms containing x^7 are ${}^9C_7 x^7 \times 1 - {}^9C_6 x^6 \times {}^4C_1 x + {}^9C_5 x^5 \times {}^4C_2 x^2 - {}^9C_4 x^4 \times {}^4C_3 x^3 + {}^9C_3$

$= x^7\left({}^9C_7 - {}^9C_6 \times {}^4C_1 + {}^9C_5 \times {}^4C_2 - {}^9C_4 \times {}^4C_3 + {}^9C_3\right)$

$= x^7(36 - 336 + 756 - 504 + 84) = 36x^7$

3. ${}^6C_r x^{12-2r}(-y)^r$

OR

n + 1

4. **(a)** 3

Explanation: Let d be the common ratio of the G.P

Given $S_8 = 82\ S_4$

$\Rightarrow \frac{S_8}{S_4} = 82$

We have $S_n = \frac{a(r^n-1)}{r-1}$

$\Rightarrow \frac{\frac{a\left(r^8-1\right)}{r-1}}{\frac{a\left(r^4-1\right)}{r-1}} = 82, r-1 \neq 0$

$\Rightarrow \frac{r^8-1}{r^4-1} = 82$

$\Rightarrow r^8 - 1 - 82r^4 + 82 = 0$

$\Rightarrow \left(r^4\right)^2 - 82r^4 + 81 = 0$

$\Rightarrow \left(r^4\right)^2 - 81r^4 - 1r^4 + 81 = 0$

$\Rightarrow r^4\left(r^4-1\right) - 81\left(r^4-1\right) = 0$

$\Rightarrow \left(r^4-81\right)\left(r^4-1\right) = 0$

$\Rightarrow r^4 = 81$ or $r^4 = 1$

Since $r - 1 \neq 0$, r cannot be 1

$\Rightarrow r = \sqrt[4]{81} = 3$

5. (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)

6. **(b)** $\frac{5}{9}(10^n - 1)$

Explanation: 5+55+555+.....

$= \frac{5}{9}\{9 + 99 + 999 + \ldots\ldots\ldots\ldots\}$

$= \frac{5}{9}\left\{[10-1] + \left[10^2-1\right] + \left[10^3-1\right] + \ldots\ldots\ldots\ldots\ldots\ldots + [10^n-1] + \ldots\ldots\ldots\right\}$

Hence by inspection we get nth term is $\frac{5}{9}[10^n - 1]$

OR

(c) $\frac{3}{5}$

Explanation: Given $\frac{T_1+T_2+T_3}{T_4+T_5+T_6} = \frac{125}{27}$

$\Rightarrow \frac{T_1+T_2+T_3}{T_1+T_2+T_3+T_4+T_5+T_6} = \frac{125}{152}$ $\left[If \frac{a}{b} = \frac{c}{d} \text{ then} \frac{a}{a+b} = \frac{c}{c+d}\right]$

$\Rightarrow \frac{S_3}{S_6} = \frac{125}{152}$

We have for a G.P , $S_n = \frac{a(r^n-1)}{r-1}, r > 1$

$\therefore \frac{\frac{a\left(r^3-1\right)}{r-1}}{\frac{a\left(r^6-1\right)}{r-1}} = \frac{125}{152}, r-1 \neq 0$

$\Rightarrow \frac{r^3-1}{r^6-1} = \frac{125}{152}$

$\Rightarrow 125r^6 - 152r^3 - 27 = 0$

$\Rightarrow 125r^6 - 125r^3 - 27r^3 - 27 = 0$

$\Rightarrow 125r^3\left(r^3-1\right) - 27\left(r^3-1\right) = 0$

$\Rightarrow \left(r^3-1\right)\left(125r^3-27\right) = 0$

$\Rightarrow r^3 = 1$ or $\frac{27}{125}$

$\Rightarrow r = 1, \frac{3}{5}$

since $r - 1 \neq 0$, r cannot be1

$\Rightarrow r = \frac{3}{5}$

7. **(d)** an ellipse
Explanation: The given equation can be written of the form
$(x-9/2)^2 + 3(y+1/3)^2 - \frac{81}{4} - \frac{1}{3} + 1 = 0$, i.e; $(x-9/2)^2 + 3(y+1/3)^2 = 235$
That is $\frac{(x-9/2)^2}{235} + 3\frac{(y+2/3)^2}{235} = 1$
This is an equation of an ellipse.

8. **(b)** (a, 0)
Explanation: $y^2 = 4\,a(x-a)$
Let Y=y and X = x-a
for standard parbola $Y^2=4aX$ the vertex is (0,0)
so put X=0 and Y=0.
i.e. put x-a = 0 and y=0
so vertex is (a,0)

9. **(a)** y – a = 0
Explanation: From the equation we infer that the parabola is open downward.
Hence the directrix passes through the point (0,a) and will be parallel to the X-axis.
Hence the equation of the directrix is y = a or y - a = 0

OR

(d) (4, 4)
Explanation: substituting for x^2 in equation (2)
$y^2 = 4y$. This implies y = 4
similarly substituting for y^2 in equation(1)
$x^2 = 4x$. This implies x = 4
Hence the other point point of intersection is (4,4)

Section B

10. Given expression is $\left(\frac{p}{2}+2\right)^8$
Here, n = 8 (even)
So, middle term = $\left(\frac{8}{2}+1\right)$th term = 5th term
$\therefore T_5 = {}^8C_4\,(p/2)^{8-4}\,(2)^4$
$= \frac{8\times7\times6\times5}{4\times3\times2\times1} \times \frac{p^4}{2^4} \times 2^4 = 70p^4$
But given, middle term = 1120
$\therefore 70\,p^4 = 1120 \Rightarrow p^4 = 16 \Rightarrow p = \pm 2$

11. Let θ be the angle between the given lines.
We have,
m_1 = Slope of the line joining (0, 0) and $(2,3) = \frac{3-0}{2-0} = \frac{3}{2}$
m_2 = Slope of the line joining (2, -2) and (3, 5) $= \frac{5+2}{3-2} = 7$
$\therefore \tan\theta = \pm\left|\frac{m_1-m_2}{1+m_1m_2}\right| = \pm\left|\frac{7-3/2}{1+7(3/2)}\right|$
$= \pm\left|\frac{11/2}{23/2}\right| = \pm\left|\frac{11}{23}\right|$
$\Rightarrow \theta = \tan^{-1}\left|\frac{11}{23}\right|$

OR

Given parallel lines are
lx + ly + h = 0
and lx + ly - r = 0
On comparing with $Ax + By + C_1 = 0$ and
$Ax + By + C_2 = 0$, we get
A = l, B = l, C_1 = h, C_2 = - r
$\therefore$Required distance= $\frac{|C_1-C_2|}{\sqrt{A^2+B^2}}$
$= \left|\frac{h+r}{\sqrt{l^2+l^2}}\right|$
$= \left|\frac{h+r}{\sqrt{2}l}\right|$

12. Since the major axis is along x-axis.
So the equation of ellipse in standard form is $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
Since the ellipse passes through point (4, 3)
$\therefore \frac{16}{a^2} + \frac{9}{b^2} = 1 \ldots$ (i)
Also the ellipse passes through point (6, 2)
$\therefore \frac{36}{a^2} + \frac{4}{b^2} = 1$....(ii)
Solving (i) and (ii), we have
$a^2 = 52$ and $b^2 = 13$
Thus equation of required ellipse is
$\frac{x^2}{52} + \frac{y^2}{13} = 1$

Section C

13. Given expansion is $(1 + x)^n$. Coefficients of 2nd, 3rd and 4th terms are ${}^nC_1$, ${}^nC_2$ and ${}^nC_3$, respectively.
Given, ${}^nC_1$, ${}^nC_2$ and ${}^nC_3$ are in AP.
$\therefore 2\,{}^nC_2 = {}^nC_1 + {}^nC_3$ [$\because$ if a, b and c are in AP, then 2b = a + c]
$\Rightarrow 2 = \frac{{}^nC_1}{{}^nC_2} + \frac{{}^nC_3}{{}^nC_2}$
$\Rightarrow 2 = \frac{n!}{1!(n-1)!} \times \frac{2!(n-2)!}{n!} + \frac{n!}{3!(n-3)!} \times \frac{2!(n-2)!}{n!}$ [$\because {}^nC_r = \frac{n!}{r!(n-r)!}$]
$\Rightarrow 2 = \frac{2}{n-1} + \frac{n-2}{3}$

$\Rightarrow 2 \times 3 (n - 1) = 6 + (n - 1) (n - 2)$

$\Rightarrow 6n - 6 = 6 + n^2 - n - 2n + 2$

$\Rightarrow n^2 - 9n + 14 = 0$

$\Rightarrow n^2 - 7n - 2n + 14 = 0$

$\Rightarrow n (n - 7) - 2 (n - 7) = 0$

$\Rightarrow (n - 2) (n - 7) = 0 \Rightarrow n = 2, 7$

But $n \neq 2$ [number of terms will be 3, which is not possible]

$\therefore n = 7$

14. $a\left(\frac{b+c}{bc}\right), b\left(\frac{c+a}{ca}\right), c\left(\frac{a+b}{ab}\right)$ are in A.P.

$\Rightarrow \frac{ab+ac}{bc}, \frac{bc+ab}{ca}, \frac{ca+cb}{ab}$ are in A.P

$\Rightarrow 1+\frac{ab+ac}{bc}, 1+\frac{bc+ab}{ca}, 1+\frac{ca+cb}{ab}$ are in A.P

$\Rightarrow \frac{ab+ac+bc}{bc}, \frac{ab+bc+ca}{ca}, \frac{ab+bc+ca}{ab}$, are in A.P

$\Rightarrow \frac{1}{bc}, \frac{1}{ca}, \frac{1}{ab}$ are in A.P

$\Rightarrow \frac{abc}{bc}, \frac{abc}{ca}, \frac{abc}{ab}$ are in A.P

a, b, c are in A.P prove

15. The foci (±4, 0)lie on x-axis.

So the equation of ellipse in standard form is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

Now vertices (± a, 0) is (± 6, 0) ⇒ a = 6

foci (± c, 0) is (± 4, 0) ⇒ c = 4

We know that $c^2 = a^2 - b^2$

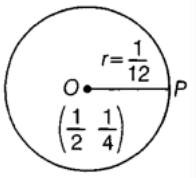
$\therefore (4)^2 = (6)^2 - b^2 \Rightarrow b^2 = 36 - 16 = 20$

Thus equation of required ellipse is

$\frac{x^2}{36}+\frac{y^2}{20}=1$

OR

Given centre is $\left(\frac{1}{2}, \frac{1}{4}\right)$



$\therefore h = \frac{1}{2}$, $k = \frac{1}{4}$ and radius, $r = \frac{1}{12}$

On putting these values in equation of circle

$(x - h)^2 + (y - k)^2 = r^2$, we get

$\left(x-\frac{1}{2}\right)^2+\left(y-\frac{1}{4}\right)^2=\left(\frac{1}{12}\right)^2$

$\Rightarrow x^2 + \frac{1}{4} - x + y^2 + \frac{1}{16} - \frac{y}{2} = \frac{1}{144}$

$\Rightarrow x^2 + y^2 - x - \frac{y}{2} + \frac{1}{4} + \frac{1}{16} - \frac{1}{144} = 0$

$\Rightarrow x^2 + y^2 - x - \frac{y}{2} + \frac{11}{36} = 0$

$\Rightarrow 36x^2 + 36y^2 - 36x - 18y + 11 = 0$

which is the required equation of circle.

Section D

16. $\frac{\frac{a+b}{2}}{\sqrt{ab}}=\frac{m}{n}$

$\frac{a+b}{2\sqrt{ab}}=\frac{m}{n}$

by C and D

$\frac{a+b+2\sqrt{ab}}{a+b-2\sqrt{ab}}=\frac{m+n}{m-n}$

$\frac{(\sqrt{a}+\sqrt{b})^2}{(\sqrt{a}-\sqrt{b})^2}=\frac{m+n}{m-n}$

$\frac{\sqrt{a}+\sqrt{b}}{\sqrt{a}-\sqrt{b}}=\frac{\sqrt{m+n}}{\sqrt{m-n}}$

by C and D

$\frac{\sqrt{a}}{\sqrt{b}}=\frac{\sqrt{m+n}+\sqrt{m-n}}{\sqrt{m+n}-\sqrt{m-n}}$

Sq both side

$\frac{a}{b}=\frac{m+n+m-n+2\sqrt{m^2-n^2}}{m+n+m-n-2\sqrt{m^2-n^2}}$

$\frac{a}{b}=\frac{m+\sqrt{m^2-n^2}}{m-\sqrt{m^2-n^2}}$

OR

Given series is 3, 15, 35, 63, ...

Here, the difference between two successive terms are 15 - 3 = 12, 35 - 15 = 20, 63 - 35 = 28,....

Clearly, these differences are in AP.

So, we use the difference method to find its n^{th} term.

Let T_n be the n^{th} term and S_n be the sum to n terms of given series. Then,

$S_n = 3 + 15 + 35 + 63 + ... + T_{n-1} + T_n$ ...(i)

Also, $S_n = 3 + 15 + 35 + ... + T_{n-1} + T_n$ ...(ii)

On subtracting Eq. (ii) from Eq. (i), we get

$0 = 3 + 12 + 20 + 28 + ... + (T_n - T_{n-1}) - T_n$

$\Rightarrow T_n = 3 + 12 + 20 + 28 + ... + (T_n - T_{n-1})$

$= 3 + \left[\frac{(n-1)}{2} \{2 \times 12 + (n - 1 - 1) 8\}\right]$

[$\because 12 + 20 + 28 + ... + (T_n - T_{n-1})$ from an AP with first term 12, common difference 8 and number of terms (n - 1)]

= 3 + (n - 1) (12 + 4n - 8)

= 3 + (n - 1) (4n + 4)

= 3 + $4n^2$ + 4n - 4n - 4

$\Rightarrow T_n = 4n^2 - 1$

Now, taking summation on both sides, we get

$S_n = \Sigma T_n$

= $\Sigma (4n^2 - 1)$

= $4 \Sigma_{n^2} - \Sigma_1$

= $4 \left\{ \frac{n(n+1)(2n+1)}{6} \right\}$ - n

= $\frac{n}{3}$ {2 (n + 1) (2n + 1) - 3}

= $\frac{n}{3}$ {$4n^2$ + 2n + 4n + 2 - 3}

= $\frac{n}{3}$ ($4n^2$ + 6n - 1)

17. i. Given equation is, 3x + 2y - 7 = 0

and it can be rewritten as

2y = -3x + 7 or $y = -\frac{3}{2}x + \frac{7}{2}$ ...(i)

which is the required slope intercept form of the given line.

On comparing Eq. (i) with y = mx + c, we get

Slope, m = $-\frac{3}{2}$ and y-intercept, $c = \frac{7}{2}$

ii. Given equation can be rewritten as

3x + 2y = 7

or $\frac{x}{7/3} + \frac{y}{7/2} = 1$ ...(ii)

which is the required form of the given line.

On comparing Eq. (ii) with $\frac{x}{a} + \frac{y}{b} = 1$, we get

$a = \frac{7}{3} \quad \text{and} \quad b = \frac{7}{2}$

Hence, x-intercept, $a = \frac{7}{3}$ and y-intercept, $b = \frac{7}{2}$

iii. Given equation is 3x + 2y = 7

Here, A = 3, B = 2 and C = 7.

$\therefore \quad \sqrt{A^2 + B^2} = \sqrt{3^2 + 2^2} = \sqrt{9 + 4} = \sqrt{13}$

On dividing the equation both sides by $\sqrt{13}$, we get

$\Rightarrow \frac{3}{\sqrt{13}}x + \frac{2}{\sqrt{13}}y = \frac{7}{\sqrt{13}}$ ...(iii)

which is the required normal form of the given line.

On comparing Eq. (iii) with x cosα + y sinα = p, we get

$\cos\alpha = \frac{3}{\sqrt{13}}, \sin\alpha = \frac{2}{\sqrt{13}}$ and $p = \frac{7}{\sqrt{13}}$

Since, cosα and sinα both are positive, therefore α is in the first quadrant

and is equal to $\sin^{-1} \frac{2}{\sqrt{13}}$ or $\cos^{-1} \frac{3}{\sqrt{13}}$.

Hence, for the given line, we have

$\alpha = \cos^{-1} \frac{3}{\sqrt{13}}$ or $\sin^{-1} \frac{2}{\sqrt{13}}$ and p = 4

Solution

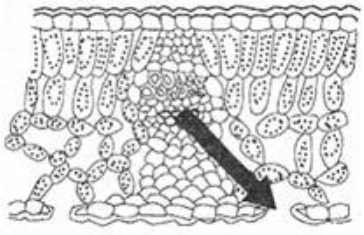
Class 11 - Biology

Unit Test II (2019-20)

Section A

1. **(b)** Translocation
   Explanation: Translocation is a biological process that occurs in all plants and involves the movement of water and other soluble nutrients through the xylem and phloem from one part of the plant to another.
2. **(d)** senescent younger leaves
   Explanation: Nitrogen deficiency symptoms include poor plant growth, and leaves that are pale green or yellow.
   Symptoms of potassium deficiency in plants include brown scorching and curling of leaf tips as well as chlorosis (yellowing) between leaf veins.
   The main symptom of magnesium deficiency, chlorosis, or yellowing between leaf veins.
3. **(c)** Carbondioxide
   Explanation: The plant factors include orientation of leaves, mesophyll cells and chloroplasts and the amount of chlorophyll.The external factors would include the availability of sunlight temperature, CO_2 concentration and water. As a plant photosynthesizes,all these factors will simultaneously affect its rate.
4. **(a)** $2\mathrm{ATP},\ 8\mathrm{NADH}_2$ and $2\mathrm{FADH}_2$
   Explanation: In kreb cycle glucose has been broken down to release carbon dioxide and eight molecules of $NADH_2$; two of $FADH_2$ have been synthesised besides just two molecules of ATP.
5. **(a)** Incomplete oxidation of glucose takes place
   Explanation: During anaerobic respiration, incomplete oxidation of glucose takes place but during aerobic respiration complete oxidation of glucose occurs in which less energy is produced.

Section B

6. The theory behind Mass flow hypothesis which is also called as pressure flow hypothesis describes the movement of sap via phloem, proposed by the German physiologist Ernst Munch in 1930. A highly concentrated organic sugar especially sugar in the cells of phloem from a source like leaf forms a diffusion gradient which draws water in the cells from adjacent xylem. This develops turgor pressure in the phloem which is also called as hydrostatic pressure.
7. 

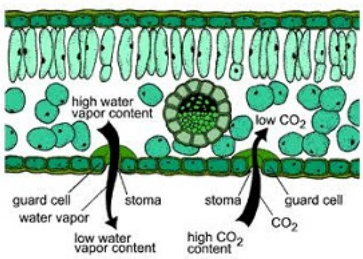


Figure . Stomata open to allow carbon dioxide (CO_2) to enter a leaf and water vapor to leave.
8. Phosphorus is a constituent of cell membranes, certain proteins, all nucleic acids and nucleotides, and is required for all phosphorylation reactions.
9. The photosystem I keeps on removing electrons from photosystem II. A continuous supply of electrons is required to further carry on the reaction. When water molecule is split, electrons are released. These electrons maintain the continuous supply from photosystem II to photosystem I. oxygen is also released after splitting of water, which helps in maintaining the balance of oxygen in the environment.

10. Steps of Aerobic Respiration
    - The complete oxidation of pyruvate by the stepwise removal of all the hydrogen atoms, leaving three molecules of CO_2.
    - The passing on of the electrons removed as part of the hydrogen atoms to molecular O_2 through electron transport chain with the simultaneous synthesis of ATP.

OR

Glycolysis is the breakdown of glucose into pyruvic acid and it does not need oxygen. So in all living beings, irrespective of them being either aerobic or anaerobic glycolysis takes place. In fact glycolysis is the first step towards oxidation of glucose and oxidation takes place either during anaerobic respiration or during aerobic respiration

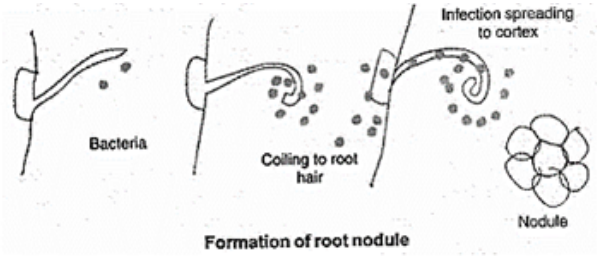
Section C

11. **Guttation and Transpiration.** Guttation is the appearance of drops of xylem sap on the tips or edges of leaves of some vascular plants, such as grasses. Guttation is not to be confused with dew, which condenses from the atmosphere onto the plant surface.
Process. At night, transpiration usually does not occur because most plants have their stomata closed. When there is a high soil moisture level, water will enter plant roots, because the water potential of the roots is lower than in the soil solution. The water will accumulate in the plant, creating a slight root pressure. The root pressure forces some water to exude through special leaf tip or edge structures, hydathodes, forming drops. Root pressure provides the impetus for this flow, rather than transpirational pull. Transpiration on the other hand happens because of transpiration pull.

OR

Water potential is the potential energy of water relative to pure free water (e.g. deionized water) in reference conditions. It quantifies the tendency of water to move from one area to another due to osmosis, gravity, mechanical pressure, or matrix effects including surface tension. Water potential is measured in units of pressure and is commonly represented by the Greek letter Ψ(Psi). This concept has proved especially useful in understanding water movement within plants, animals, and soil.
Typically, pure water at standard temperature and pressure (or other suitable reference condition) is defined as having a water potential of 0. The addition of solutes to water lowers its potential (makes it more negative), just as the increase in pressure increases its potential (makes it more positive). If possible, water will move from an area of higher water potential to an area that has a lower water potential.
One very common example is water that contains a dissolved salt, like seawater or the solution within living cells. These solutions typically have negative water potentials, relative to the pure water reference. If there is no restriction on flow, water molecules will proceed from the locus of pure water to the more negative water potential of the solution.
Water potential of a cell is affected by both solute and pressure potential. The relationship between them is as follows:
$\Psi_w = \Psi_s + \Psi_p$

12. **Steps in the development of root nodules:**
    i. Rhizobium bacteria contact susceptible root hair, divide near it.
    ii. Upon successful infection of the root hair cause it to curl,
    iii. Infected thread carries the bacteria to the inner cortex. The bacteria get modified into rod-shaped bacteroids and cause inner cortical and pericycle cells to divide. Division and growth of cortical and pericycle cells lead to nodule formation.
    iv. A mature nodule is complete with vascular tissues continuous with those of the root.



Formation of root nodule

13. The deficiency symptoms tend to appear first in the young tissues whenever the elements are relatively immobile and are not transported out of the mature organs, for example, elements like sulphur and calcium

are a part of the structural component of the cell and hence are not easily released.

For elements that are actively mobilized within the plants and exported to young developing tissues, the deficiency symptoms tend to appear first in the older tissues.

14. RuBisCO has a much greater affinity for CO_2 than for O_2. It is the relative concentration of O_2 and CO_2 that determines which of the two will bind to the enzyme.
In C_3 plants some O_2 does bind to RuBisCO, and hence CO_2 fixation is decreased. Here the RuBP instead of being converted to 2 molecules of PGA binds with O_2 to form one molecule and phosphoglycolate in a pathway called photorespiration. In the photorespiratory pathway, there is neither synthesis of sugars, nor of ATP. Rather it results in the release of CO_2 with the utilization of ATP. In the photorespiratory pathway, there is no synthesis of ATP or NADPH. Therefore, photorespiration is a wasteful process.
In C_4 plants photorespiration does not occur. This is because they have a mechanism that increases the concentration of CO_2 at the enzyme site. This takes place when the C_4 acid from the mesophyll is broken down in the bundle cells to release CO_2- this results in increasing the intracellular concentration of CO_2. In turn, this ensures that the RuBisCO functions as a carboxylase minimizing the oxygenase activity.
15. Light reactions or the photochemical phase include following steps:
- light absorption,
- water splitting,
- oxygen release, and
- the formation of high energy chemical intermediates, ATP and NADPH.
Several complexes are involved in the process. The pigments are organised into two discrete photochemical light harvesting complexes (LHC) within the Photosystem I {PS I} and Photosystem II (PS II). These are named in the sequence of their discovery, and not in the sequence in which they function during the light reaction. The LHC are made up of hundreds of pigment molecules bound to proteins. Each photosystem has all the pigments (except one molecule of chlorophyll a) forming a light harvesting system also called antennae. These pigments help to make photosynthesis more efficient by absorbing different wavelengths of light. The single chlorophyll a molecule forms the reaction centre. The reaction centre is different in both the photosystems. In PS I the reaction centre chlorophyll a has an absorption peak at 700 nm, hence is called P700, while in PS II it has absorption maxima at 680 nm, and is called P680.

Section D

16.
- The metabolic pathway through which the electron passes from one carrier to another, is called the electron transport system {ETS) and it is present in the inner mitochondrial membrane.
- The energy stored in NADH $+H^+$ and $FADH_2$ is used as they move through ETS. This is accomplished when they are oxidized through the electron transport system and the electrons are passed on to O_2 resulting in the formation of H_2O.
- Electrons from NADH produced in the mitochondrial matrix during citric acid cycle are oxidised by an NADH dehydrogenase (complex I), and electrons are then transferred to ubiquinone located within the inner membrane. Ubiquinone also receives reducing equivalents via $FADH_2$ (complex II) that is generated during oxidation of succinate in the citric acid cycle.
- The reduced ubiquinone is then oxidised with the transfer of electrons to cytochrome c via cytochrome bc1 complex (complex III).
- Cytochrome c acts as a mobile carrier for transfer of electrons between complex III and IV. Complex IV refers to cytochrome c oxidase complex containing cytochromes a and a^3, and two copper centres.
- When the electrons pass from one carrier to another via complex I to IV in the electron transport chain, they are coupled to ATP synthase (complex V) for the production of ATP from ADP and inorganic phosphate. The number of ATP molecules synthesized depends on the nature of the electron donor.
- Oxidation of one molecule of NADH gives rise to 3 molecules of ATP, while that of one molecule of $FADH_2$ produces 2 molecules of ATP. The presence of oxygen is vital, since it drives the whole process by removing hydrogen from the system. Oxygen acts as the final hydrogen acceptor.
- Unlike photophosphorylation where it is the light energy that is utilized for the production of proton gradient required for phosphorylation, in respiration it is the energy of oxidation-reduction utilized for

the same process. It is for this reason that the process is called oxidative phosphorylation.

- The energy released during the electron transport system is utilized in synthesizing ATP with the help of ATP synthase (complex V). This complex consists of two major components, F_1 and F_0. The F_1 headpiece is a peripheral membrane protein complex and contains the site for synthesis of ATP from ADP and inorganic phosphate. F_0 is an integral membrane protein complex that forms the channel through which protons cross the inner membrane. The passage of protons through the channel is coupled to the catalytic site of the F, component for the production of ATP. For each ATP produced, $2H^+$ passes through F_0 from the inter membrane space to the matrix down the electrochemical proton gradient.

OR

Steps of cellular respiration:

i. Glycolysis: Glycolysis is the first step in cellular respiration. During glycolysis, glucose undergoes partial oxidation to form pyruvic acid. From 1 molecule of glucose, 2 molecules of pyruvic acid is formed.

ii. Aerobic or Anaerobic respiration**:**

- In the absence of oxygen pyruvic acid is converted into lactic acid or ethanol.
- Citric Acid Cycle: Under aerobic conditions, the pyruvic acid enters citric acid cycle NADH + H^+ and FADH2 which enter into the ETS.

  Pyruvic acid + CoA + $NAD^+ \xrightarrow{Mg^{2+}}$ Acetyl CoA + NADH + H^+

iii. Electron Transport System (ETS) and Oxidative Phosphorylation

- Energy stored in NADH+H^+ and FADH2 is utilised to form ATP. This is accomplished when they are oxidised through the electron transport system and the electrons are passed on to O_2 resulting in the formation of H_2O.
- When the electrons pass from one carrier to another in the electron transport chain, they are coupled to ATP synthase for the production of ATP from ADP and inorganic phosphate.

Solution

Class 11 - Physical Education

Unit Test II (2019-20)

Section A

1. Physical activity simply means movement of the body that uses energy.
2. i. Endurance
   ii. Strong determination
3. There are four types trekking
   i. Easy trekking
   ii. Moderate trekking
   iii. Strenuous trekking
   iv. Difficult trekking
4. Somato types basically means body types which is further classified into three types i.e. Endomorph, Mesomorph and Ectomorph.
5. Measurement is about collection of data and information about certain skills of levels of fitness of an individual by using tests and relevant techniques.
6. A test is a tool which is used evaluate the quality, performance and reliability of the task completed by a person.
7. It is the process of education that involves collection of data from the products which can be used for comparison with preconceived criteria to make judgement.
8. It is the number of pumping/contractions of heart in one minute. It is about 72 times per minute under normal conditions in an adult.
9. Force can be defined as a push or pull by one body acting upon another. Force is a product of mass and acceleration of an object or person.
10. Axial skeleton system transmits weight from head, trunk the upper limbs down to the hip joints. It is responsible for the upright position of the human being.

Section B

11. **Trekking:** Trekking means going on a long and difficult journey, especially on foot. Its course often includes over mountainous regions and woods.
    i. a. **Easy trekking:** The indiviudals specially the beginners are offered easy treaks.
       b. **Moderates trekking:** Moderates trekking are slightly difficult and challenging than easy treks.
    ii. **Strenous trekking:** Strenous trekking a lot of physical effort, energy and determination is required.
    iii. **Difficult trekking:** Such type of trekking is suitable only for real adventure seekers.

    OR

    Always swim or surf at places patrolled by surf lifesavers or lifeguards. Swim between the red and yellow flags. They mark the safest area to swim. Always swim under supervision or with a friend. Read and obey the signs. Don'tswim directly after a meal. Don't swim under the influence of drugs or alcohol. If you are unsure of surf conditions, ask a lifesaver or lifeguard. Never run and dive in the water. Even if you have checked before, conditions can change.

    If you get into trouble in the water, don't panic. Raise your arm for help, float and wait for assistance. Float with a current or undertow. Stay calm. Don'ttry to swim again stit. Signal for help and wait for assistance.
12. Leg length- The leg length of a child or adult is measured with a flexible tape from the bottom to the upper edge of great trochanter.

Upper leg length- The subject is made to sit on a box with one of the knee bent at 90 degree with his back upstraight measure the upper leg length from the inguinal crease to proximal border of patella. Record the measurement to the nearest 0.1 cm.

13. $\text{BMI} = \frac{\text{Weight in Kg}}{(\text{ Height in m})^2}$

    $\text{BMI} = \frac{80}{1.6 \times 1.6} = \frac{80 \times 100}{16 \times 16} = \frac{8000}{256} = 31.25$

    The above person falls in class - 1 Category obesity.
14. The main functions of respiratory system are given as under:
    i. To exchange oxygen and carbon dioxide between the air and blood
    ii. To produce sound, it helps vocal chords to produce sound
    iii. To regulate blood PH level.
    iv. To protect against some micro organism. Respiratory system blocks the entry of microorganism in the body at various levels, thus it provides protection against harmful microorganisms like virus, bacteria, etc.
15. Dynamic stability is balancing the body during movement. It frequently happens that the line of gravity of an athlete will fall outside the base of support for the movement. For example, in a sprint start, the body weight is ahead of the supporting foot but before the body can fall forward the other foot moves ahead to provide support and the process repeats itself. A man carrying the heavy bucket in his right-hand leans towards his left-hand side to maintain equilibrium. While climbing up a hill the climber bends forward so that he does not fall. The equilibrium is maintained by bringing the CG down.

Section C

16. In the field of games and sports programme. It is important to select a target. If a person desires to improve himself in different aspects of fitness. He will have to undergo fitness programmes. Test, Measurement & evaluation in physical education are the devices that are needed to collect the details regarding the needs, abilities and attitudes of a sports person.

    A test is basically a situational presentation, where specific responses are collected from the subject. These responses are measured both qualitatively and quantitatively.

    Measurement is about collection of data as performance or task and completed by a sports person by using test and scientific techniques.

    Evaluation is the process of physical education that involves collection of data from the products which can be used for comparison with preconceived criteria to make judgement.

    Importance of Test, Measurement & Evaluation

    The importance of test, measurement & evaluation in the field of games & sports are the following ways.

    i. To frame the objectives: Setting target and goal according to the need and requirement.
    ii. To realize that the objectives are achieved or not.
    iii. To understand the need, ability and capacity for any individual.
    iv. To evaluate the learner: so that feed back can be given.
    v. To evaluate teaching programme.
    vi. For the classification or grading of the students.
    vii. To check the progress or improvement of the learner time to time.
    viii. For diagnosis of learning program: Bio-mechanics, motor skill and cognitive etc.
    ix. Prediction of future performance.
    x. Selection of team or individual events and a player.
    xi. For intensive type of research it is eeential.
    xii. For the pose of guidence of counselling.

xiii. Evaluate different methods of instruction.

OR

The four importance in the physical education field are given below of test, measurement & evaluation :

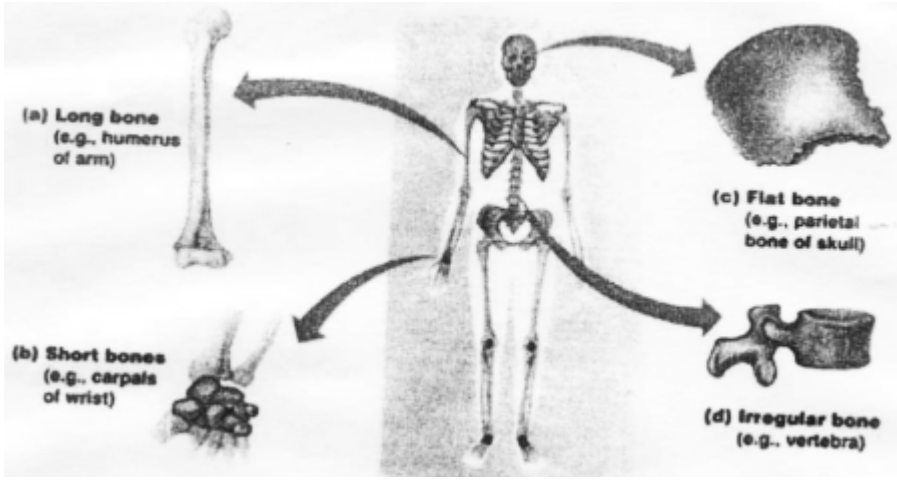
i. **To frame the objectives:** Test and Measurement helps is setting the target or goal according to the need and requirement, By adopting the Test and Measurement techniques the physical education teachers get an accurate idea about the progress made by the students.
ii. **To evaluate the learners-** In the field of physical education and sports Test and Measurement helps in collection of data which further helps in evaluating the learners ability separately. It also helps the sports person in enchancing his sports performance.
iii. **To evaluate teaching programme-**Test and measurement is a scientific tool which helps the teacher to adopt correct methodology upon the sportsman so that desired results may be achieved.
iv. **To discover the needs and requirements of the participants-** Needs of the participants are correctly assessed by the scientific approach of Test and Measurement. It helps in knowing where more emphasis is needed so that target may be achieved.

17. i. **Improves performance in sports:** principles of biomechanics tell us about right techniques, effective and result oriented posture to get more efficient results by applying a minimum muscular force which in turn improves performance in sports.
ii. **Improvement in technique:** with the help of biomechanical principles the physical education teacher corrects the mistakes. This helps in improving the game and performance of the player.
iii. **Development of improved sports equipment:** the principles of biomechanics are used to modify the sports equipment. For example, T-shirts, studs, spikes, swimming costumes, hockey sticks, different size footballs and low weight helmets for protection
iv. **Improve in the training techniques:** a teacher can analyse the player's movement or action with the help of the biomechanical principles. It helps in improving the training techniques.
v. **Prevents sports injuries:** it helps to find out the factors or the forces that can lead to injuries during the game situation. It also helps in prevention of the sports injury.
vi. **Helps in understanding human body:** it gives the knowledge of different systems of our body. For example, nervous system, muscular system, and skeletal system.
vii. **Knowledge of safety principles:** biomechanics gives the understanding to analyse different movements that can harm the player. The teachers remove those unnecessary and harmful movements.
viii. **Helps in research work:** biomechanics helps in teaching and learning process, It also helps the teacher to acquire precision and accuracy of movement.
ix. **Creates confidence in player:** The player knows that he is executing the movement scientifically with the help of principal of biomechanics. Thus the confidence of the player is enhanced.
x. **Helps in maintaining healthy body:** Principles of biomechanics gives deep knowledge about the effect of physical forces and movements over the body as well as the movements which are safe and promotes health. Thus biomechanics helps in maintaining healthy body.
xi. **Increases the popularity of sports:** biomechanical principles have brought remarkable improvements in respect of technique, equipment, skill and playfields. Ithelps in promoting the games and sports in the masses.

OR

Classification of Bones

i. **Long bones:-** They are long and wide. They act as lever. They are found in legs and arms. Example: humerus, femur, tibia and fibula.
ii. **Short bones:-** They are short in size and cube shaped. They are found in wrist and phalanges. Example: metatarsal and carpal.
iii. **Flat bones:-** These bones are flat and thin. They are composed of a central layer of sponge bone fixed between two outer layers of compact bone. Example: ribs and shoulder.
iv. **Sesamoid bones:-** These bones are seed like shaped and developed in the tendons where there is more friction. Example: palms of hands, sole of feet and knee caps,
v. **Irregular bones:-** These bones have in complete shaped as compared to other types. The bones of spinal column and skull are examples of these bones.
They are situated in Sutura points in the skull.


(a) Long bone
(e.g., humerus
of arm)
(b) Short bones
(e.g., carpals
of wrist)
(c) Flat bone
(e.g., parietal
bone of skull)
(d) Irregular bone
(e.g., vertebra)