NALANDA OPEN UNIVERSITY
Intermediate of Science (I.Sc.), Part-I
Mathematics, Paper-I
Annual Examination, 2023

Time: 3.00 Hrs.   Full Marks: 80

Answer any **Five** Questions. Question No.1 is compulsory.
All questions carry equal marks.

1. Select the correct answer from the following questions. Each part of the questions carries one mark.

(a) $(A \cap B) \cap B$ is :
(i) A   (ii) B   (iii) $A \cap B$ (iv) None of these

(b) If a set A has n elements then the number of elements in the power set P(A) is :
(i) 2n   (ii) 2^n (iii) n^2 (iv) None of these

(c) Which one is correct, $1 + w + w^2$ is equal to
(i) -1 (ii) 1   (iii) 0   (iv) None of these

(d) If $^{15n}C_r : {}^{15n}C_{r-1} = 11:5$, then ^8C_r is equal to :
(i) 30   (ii) 65   (iii) 56   (iv) None of these

(e) If $f(x) = x^2 + 5x + 6$, $x \in R$, then $f(-2)f(3)$ is :
(i) 3   (ii) 2   (iii) 0   (iv) None of these

(f) The value of $C_0 + C_2 + C_4 + C_6 + \ldots$ in $(1+x)^n$ is :
(i) 2^n (ii) 2^{n-1} (iii) $2n-1$ (iv) None of these

(g) $\tan^{-1}x + \cot^{-1}x$ is equal to :
(i) $\dfrac{\pi}{2}$ (ii) π (iii) $\dfrac{\pi}{3}$ (iv) None of these

(h) $\log_4 32$ is equal to :
(i) 5   (ii) $\dfrac{2}{5}$ (iii) $\dfrac{5}{2}$ (iv) None of these

(i) If $\sin\theta = \dfrac{\sqrt{3}}{2}$, then θ is equal to :
(i) $\dfrac{\pi}{6}$ (ii) $\dfrac{\pi}{3}$ (iii) $\dfrac{\pi}{2}$ (iv) None of these

(j) If $A + B + C = \pi$, then $\cos A + \cos B + \cos C$ is equal to :
(i) $\sin A \cdot \sin B \cdot \sin C$ (ii) $\cos A \cdot \cos B \cdot \cos C$
(iii) $\sin A + \sin B + \sin C$ (iv) $1 + 4\sin\dfrac{A}{2} \cdot \sin\dfrac{B}{2} \cdot \sin\dfrac{C}{2}$

(k) If the equations $x^2 + px + q = 0$ and $x^2 + qx + p = 0$ have a common root then $p+q+1$ is equal to :
(i) 0   (ii) 1   (iii) 2   (iv) None of these

(l) If $a \neq b \neq c \neq 0$ such that :
$\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = 0$, then $\dfrac{1}{a} + \dfrac{1}{b} + \dfrac{1}{c}$ is equal to :
(i) 1   (ii) -1 (iii) 0   (iv) None of these

(m) For all values of q the locus of the point of intersection of the lines $x \cos\theta + y \sin\theta = a$ and $x \sin\theta - y \cos\theta = b$ is :
(i) a circle   (ii) an ellipse   (iii) a hyperbola   (iv) a parabola

(n) The triangle formed by the lines $x + y - 4 = 0$, $3x + y = 4$, $x + 3y = 4$ is :
(i) Isosceles   (ii) Equilateral   (iii) Right-angled   (iv) None of these

(o) The eccentricity of the parabola $x^2 - 4x - 4y + 4 = 0$ is :
(i) $e = 0$ (ii) $e = 1$ (iii) $e = 4$ (iv) None of these

(p) If $y - x - 2 = 0$ touches the parabola $y^2 = 8x$ then its point of contact is :
(i) (2, 4)   (ii) (1, 2)   (iii) (2, 3)   (iv) None of these

P. T. O.

2. Find the sum to n terms of the series :

$1 \cdot 2 \cdot 5 + 2 \cdot 3 \cdot 6 + 3 \cdot 4 \cdot 7 + \ldots\ldots$ to n terms.

3. How many terms are identical in the progressions 2, 5, 8, 11 ....179 and 3, 5, 7, ...101. ? Identify them.

4. For all real values of x, show that $\left(\dfrac{x^2 + 34x - 71}{x^2 + 2x - 7} \right)$ never lies between 5 and 9.

5. Prove that $^{n}C_0 \,^{n}C_r + \,^{n}C_1 \,^{n}C_{r+1} + \ldots\ldots\ldots + \,^{n}C_{n-1} \,^{n}C_n = \dfrac{2n}{(n-r)(n+r)}$.

6. Prove that $\Delta = \begin{vmatrix} b^2 + c^2 & ab & ac \\ ab & c^2 + a^2 & bc \\ ac & bc & a^2 + b^2 \end{vmatrix} = 4a^2 b^2 c^2$.

7. In a $\triangle$ ABC prove that $a^2 \cos(B - C) + b^2 \cos(C - A) + c^2 \cos(A - B) = 3abc$.

8. Find the value of n so that $\left(\dfrac{a^{n+1} + b^{n+1}}{a^n + b^n} \right)$ is the geometric mean between a and b.

9. How many even numbers of four digits can be made with the digits 0, 3, 4, 5, 9.

10. A straight line touches the circle $x^2 + y^2 = 2a^2$ and the parabola $y^2 = 8ax$. Show that its equation is $y = \pm(x + 2a)$.

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NALANDA OPEN UNIVERSITY
Intermediate of Science (I.Sc.), Part-I
Chemistry, Paper-I
Annual Examination, 2023

Time: 3.00 Hrs.   Full Marks: 80

Answer **Five** Questions in all, selecting atleast Two Questions from each Group.
Question No.1 is compulsory. All questions carry equal marks.

1. Choose the correct answer in the following :-
    (i)   The electronic configuration of Cu is :
            (a) [Ar] $3d^9 4s^2$ (b) [Ar] $3d^{10} 4s^1$ (c) [Ar] $4d^8 4s^2 4p^1$ (d) [Ar] $3d^7 4s^2 4p^2$

    (ii)   Which of the following is mono atomic gas :—
            (a) Oxygen   (b) Helium
            (c) Nitrogen   (d) Chlorine

    (iii)   Oxidation number of Cr in $K_2Cr_2O_3$ is:—
            (a) 2   (b) 4   (c) 3   (d) 6

    (iv)   Valency of Ar is :—
            (a) 0   (b) 1   (c) 2   (d) 3

    (v)   Which is of 3d block elements :
            (a) V   (b) K   (c) Br   (d) Ag

    (vi)   Most electropositive element is :—
            (a) K   (b) Na   (c) Li   (d) Cs

    (vii)   Which of the following is not the noble gas :
            (a) He   (b) Ne
            (c) Ar   (d) Fe

    (viii) Which is not transition element of following :
            (a) Ti   (b) V   (c) Cr   (d) Be

GROUP - 'A'

2. Write the hybridisation, structure and shape of the following :—
    (a) CH_4 (b) NH_3 (c) PCl_5 (d) BCl_3

3. Write the electronic dot formula of the following :—
    (a) $CaCl_2$ (b) Na_2O (c) HCHO (d) HClO

4. Explain the following terms :—
    (a) Electronegativity (b) pH (c) Ionisation Potenetial

5. Determine the oxidation number of the central atom and equivalent weight of the given compounds :—
    (a) $K_2Cr_2O_7$ (b) $KMnO_4$ (c) H_2SO_4 (d) HNO_2

6. Fill in the Blanks :—
    (a) Hybridisation of Carbon in C_2H_2 is ....
    (b) Mercury is in .... state at room temperature.
    (c) Glycol is .... alcohol.
    (d) Water is .... solvent.
    (e) Water is more .... than alcohol.
    (f) No. of π bonds in Acetylene is ....
    (g) No. of core electrons in Mg is ....
    (h) Maximum no. of electrons in any shell is ....

P.T.O.

GROUP - 'B'

7. Write short notes on the following :
   (a) $FeSO_4 . 7H_2O$ (b) Ores and Minerals (c) Paramagnetism and Diamagnetism

8. Explain the following :—
   (a) Morality (b) Mole fraction
   (c) d-block elements (d) Inner transition element

9. Explain the characteristics of d-block elements on the following basis :
   (a) Colour (b) Magnetic properties (c) Complex formation

10. Write the IUPAC name of following compounds :
    (a) $[Ptcl4]^{-2}$ (b) $[FeF6]^{-3}$ (c) $[Cr(H_2O)6]^{+2}$ (d) $[Co(NH_3)_4Cl_2]^{+2}$

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Programme of I.Sc. Part-I Counselling and Practical Exam' 2023

Venue : **For Botany - 1st Floor, Bio Lab, Biscomaun Tower, Patna**
For Chemistry - 4th Floor, Chemistry Lab, Biscomaun Bhawan, Patna
For Physics - 1st Floor, Physics Lab, Biscomaun Tower, Patna

Practical Counselling

Date	Time		
	09.00 AM to 11.00 AM	**11.00 AM to 02.00 PM**	**02.30 PM to 05.30 PM**
28.03.2023	**Botany [All Students] [Biology, Paper-I]**	**Chemistry [All Students]**	**Physics [All Students]**

Practical Examination

Date	Time	
	10.00 AM to 01.00 PM	**02.00 PM to 05.00 PM**
31.03.2023	**Botany [All Students] [Biology, Paper-I]**	**Chemistry [All Students]**
01.04.2023	**Physics [All Students]**	

Time : 3.00 Hrs.   **Full Marks : 80**

Answer any **Five** Questions. Question No.1 is compulsory.
All questions carry equal marks.

1. Select the correct option in each of the following. Each part of the questions carries 1 mark.

    (a) If xy is a torque and y is the distance of the particle from the axis of rotation, then x is :—
    (i)   Mass   (ii)   Velocity
    (iii) Force   (iv)   Displacement

    (b) If x is error in the determination of a physical quantity X, then percentage error is :—
    (i) $\frac{x}{X} \times 100\,\%$ (ii) $\frac{x}{X} \times 100$ (iii) $\frac{X}{x} \times 10\,\%$ (iv) $\frac{X}{x} \times 100\,\%$

    (c) The numerical value of Newton into dyne is :—
    (i) 10^{10} dyne   (ii) 10^{5} dyne   (iii) 10^{15} dyne   (iv) None of these

    (d) If $\vec{P} + \vec{Q} = \vec{R}$ and $|P| + |Q| = |R|$, then the angle between P and Q is :—
    (i)   120°   (ii)   90°   (iii)   0°   (iv)   30°

    (e) If displace $Y \propto t^2$ where t^2 is time, then the velocity is :—
    (i)   Constant   (ii)   Variable
    (iii) Zero   (iv)   None of these

    (f) A spring blame is kept horizontally, its two ends are pulled by a force of 5 kg, then its reading will be :—
    (i)   5 kg. wt.   (ii)   5 Newton
    (iii) 9.8 kg. wt.   (iv)   None of these

    (g) A wheel of radius 2 meter is making 60 resolution per second, then linear velocity of a pt. on rim will be :—
    (i) 2π (ii) $\pi/3$
    (iii) π (iv)   None of these

    (h) 64 rain drops combine to form a single drop. The ratio of the total surface energy of all the drops to that of the single drop is :—
    (i)   4 : 1   (ii)   64 : 1
    (iii) 1 : 4   (iv)   8 : 1

    (i) A barometer reads 72 cm of mercury, then what will be the pressure in bars
    (i)   0.959616   (ii)   13.6 bars
    (iii) 9.8 bars   (iv)   1 bar

    (j) 273°a is equal to
    (i)   0°c   (ii)   −260°c   (iii)   −273°c   (iv)   None of these

    (k) For a gram molecule of a gas, the quantity pV/T is called :—
    (i)   a constant   (ii)   mass
    (iii) number of moles of the gas   (iv)   universal gas constant

    (l) 2 gm mole of a gas is heated thorugh 30°c at constant pressure. The work done is nearly equal to :—
    (i)   480 joule   (ii)   490 joule   (iii)   500 joule   (iv)   None of these

    (m) The maximum wavelength of a transverse wave set up in a string of length L, is :—
    (i)   L   (ii) $\frac{L}{2}$ (iii)   2L   (iv)   4L

P. T. O.

(n) The interval between two nodes of frequencies 256 c/s & 512 c/s is :—

    (i)   2   (ii)   786   (iii) ½   (iv)   256

(o) The propagation of wave inside an open orfan pipe takes place due to :—
    (i)   rarefaction at the end of the mouth   (ii)   rarefaction just outside the mouth
    (iii) comprenin just outside the mouth   (iv)   None of these

(p) The numerical sum of velocity and acceleration in a S.H.M. is always :—
    (i)   Constant   (ii)   Zero
    (iii) Either constant of zero   (iv)   None of these

2. Derive the formula for 'The maximum height attained' and 'time of flight' of a projectile projected with velocity v at an angle θ with the horizontal.

3. Explain centripetal and centrifugal forces. Deduce expression for centripetal force acting on particle moving uniformly along a circle.

4. What is Hooke's Law ? Define the various elastic constants. Find the energy stored in a stretched wire.

5. Define Surface Tension. Obtain expression for rise of water in a narrow capillary tube glass kept vertically and partially dipped in water.

6. Discuss the composition of two mutually perpendicular S.H.Ms about the same central point.

7. State the postulates of kinetic theory of gases. On its basis deduce expression for the pressure of an ideal gas.

8. State and explain the 1st law of thermodynamics.

9. Discuss Laplace's correction in the expression for velocity of sound in air. What is the effect of temperature on the velocity of sound.

10. Describe the construction and working of a constant volume standard hydrogen thermometer. Mention its merits.

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Programme of I.Sc. Part-I Counselling and Practical Exam' 2023

Venue   :   **For Botany - 1st Floor, Bio Lab, Biscomaun Tower, Patna**
                 For Chemistry - 4th Floor, Chemistry Lab, Biscomaun Bhawan, Patna
                 For Physics - 1st Floor, Physics Lab, Biscomaun Tower, Patna

Practical Counselling

Date	Time		
	09.00 AM to 11.00 AM	**11.00 AM to 02.00 PM**	**02.30 PM to 05.30 PM**
28.03.2023	**Botany [All Students] [Biology, Paper-I]**	**Chemistry [All Students]**	**Physics [All Students]**

Practical Examination

Date	Time	
	10.00 AM to 01.00 PM	**02.00 PM to 05.00 PM**
31.03.2023	**Botany [All Students] [Biology, Paper-I]**	**Chemistry [All Students]**
01.04.2023	**Physics [All Students]**	

Nalanda Open University
Annual Exam-2022
Intermediate of Science (I.Sc.), Part-I
Botany, Paper-I

Time: 3.00 Hrs.   **Full Marks: 80**

Answer any **Five** Questions. Question No.1 is compulsory.All questions carry equal marks.

1. Select the correct answer in the following statements.

    (i)   Which one of the following helps in Nitrogen fixation:

    (a) Albugo   (b) Nostoc   (c) Penicillium   (d) Puccinia

    (ii)   Which of the following lack Chlorophyll:

    (a) Fungi   (b) Algae   (c) Bryophyta   (d) Pteridophyta

    (iii) Fluid Mosaic model of Plasma membrane was given by:

    (a) Du Praun   (b) Daniel   (c) Robertson   (d) **Singer and Nicholson**

    (iv)   True nucleus is absent in:

    (a) Bacteria   (b) Green Algae   (c) Fungi   (d) Lichen

    (v)   Energy currency of cell is:

    (a) AMP   (b) ATP   (c) ADP   (d) GTP

    (vi)   Proteins are synthesized by:

    (a) Ribosomes   (b) Mitochondria   (c) Golgi body   (d) Centrosome

    (vii) Who is associated with Green Revolution in India:

    (a) EJ Butler   (b) M S Swaminathan   (c) R S Prasad   (d) BP Pal

    (viii) Verticillaster inflorescence is found in :

    (a) Leguminosae   (b) Cruciferae   (c) Labiatae   (d) Compositae

    (ix)   Ozone hole accelerated due to release of :

    (a) CO_2 (b) CFC   (c) Petroleum   (d) SO_2

    (x)   The phenotypic ratio of a Dihybrid back croos is:

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

    (xi)   Phellogen is :

    (a) Apical meristem   (b) Intercalary meristem   (c) Lateral meristem   (d) None of these

    (xii) Light reaction occurs in :

    (a) Grana   (b) Stroma   (c) Both (a) and (b)   (d) None of these

    (xiii) Which plant hormone induces cell division:

    (a) Cytokinin   (b) GA

    (c) Ethylene   (d) Auxin

    (xiv) A Phyllode is a:

    (a) Modified stem   (b) Modified root   (c) Modified Flower   (d) Modified leaf

(xv) Which of the fallowing gases contributes to global warming:

    (a) Nitrogen dioxide   (b) Carbon dioxide

    (c) Sulphur Dioxide   (d) Carbon monoxide

(xvi) Pyramids of Biomass in an ecosystem is:

    (a) Always upbright

    (b) Inverted

    (c) Upright or inverted

    (d) None of above

2. Write briefly:

    (a) Two medicinal plants. (Economic importance, Botanical name and family)

    (b) Two timber yielding plants. (Economic importance, Botanical name and Family)

3. Describe ultra-structure of TMV.

4. Describe Prophase I of Meiosis with suitable diagram.

5. Describe the structure and function of Chloroplast.

6. Describe different laws of inheritance as proposed by Mendel.

7. What is Mutation? Describe briefly.

8. What is succession? Describe succession in a pond.

9. What do you understand by the term pollution? Describe briefly causes of air pollution and its remedy.

10. Describe modification of stem with suitable diagram.

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Programme of I.Sc. Part-I Counselling and Practical Exam' 2022

Venue : For Botany - 1st Floor, Bio Lab, Biscomaun Tower, Patna
For Chemistry - 4th Floor, Chemistry Lab, Biscomaun Bhawan, Patna
For Physics - 1st Floor, Physics Lab, Biscomaun Tower, Patna

Practical Counselling

Date	Time	
	09.00 AM to 12.00 Noon	12.30 PM to 3.30 PM
21.08.2022	Botany [Biology, Paper-I] [All Students]	—
25.08.2022	—	Chemistry [All Students]
01.09.2022	Physics [All Students]	—

Practical Examination

Date	Time	
	09.00 AM to 12.00 Noon	12.30 PM to 3.30 PM
25.08.2022	Botany [Biology, Paper-I] [All Students]	—
26.08.2022	—	Chemistry [All Students]
02.09.2022	Physics [All Students]	—

NALANDA OPEN UNIVERSITY
Intermediate of Science (I.Sc.), Part-I
Chemistry, Paper-I
Annual Examination, 2022

Time: 3.00 Hrs.   Full Marks: 80

Answer **Five** Questions in all, selecting atleast Two Questions from each Group.
Question No.1 is compulsory. All questions carry equal marks.

1. Choose the correct answer in the following :-
    (i) The electronic configuration of Cr is :—
         (a) $(Ar)3d^4 4S^2$ (b) $(Ar)3d^5 4S^1$
         (c) $(Kr)3d^5 4S^1$ (d) $(Kr)3d^4 4S^2$

    (ii) Which of the following is mono atomic gas :—
         (a) Helium   (b) Oxygen
         (c) Nitrogen   (d) Chlorine

    (iii) Oxidation number of Cr in $K_2Cr_2O_7$ is:—
         (a) 6   (b) 5   (c) 7   (d) 4

    (iv) Valency of Magnesium is :—
         (a) 3   (b) 1   (c) 2   (d) 4

    (v) Select which element is known as alkali metal :—
         (a) Mg   (b) Al   (c) Na   (d) Fe

    (vi) Most electropositive element is :—
         (a) K   (b) Na   (c) Li   (d) Cs

    (vii) Which of the following is noble gas element :—
         (a) Argon   (b) Oxygen
         (c) Chlorine   (d) Nitrogen

    (viii) Which is transition element :—
         (a) Na   (b) Mg   (c) Mn   (d) Al

GROUP - A

2. Fill in the Blanks :—
    (a) Hybridisation of Carbon is C_2H_4 is ....
    (b) Mercury is in .... state at room temperature.
    (c) Organic compounds are generally soluble in .... solvents.
    (d) Glycol is .... alcohol.
    (e) Water is .... solvent.
    (f) No. of π-bonds in Acetylene is ....
    (g) No. of core electrons in Sodium is ....
    (h) Maximum no. of electrons in any shell is ....

3. Write the hybridisation, structure and shape of the following :—
    (a) CH_4 (b) NH_3 (c) H_2O (d) BF_3

4. Write the electronic dot formula of the following :—
    (a) CaO   (b) H_2SO_4 (c) HNO_3 (d) HCHO

5. Explain the following terms :—
    (a) Electronegativity   (b) Normality   (c) pH   (d) Ionisation Potenetial

6. Determine the oxidation number of the central atom and equivalent weight of the given compounds :—
    (a) $K_2Cr_2O_7$ (b) $KMNO_4$ (c) H_2SO_4 (d) HNO_3

P. T. O.

7. Write short notes on the following :—
   (a) $FeSO_4\ 7H_2O$ (b) $(CaSo_4)_2\ H_2O$
   (c) Ores and Minerals   (d) $NaHCO_3$

8. Write the IUPAC name of the following complex compounds :—
   (a) $K_4\left[Fe(CN)_6\right]$ (b) $\left[Co(NH_2)_6\right]^{3+}$
   (c) $(NiCl_4)^{2-}$ (d) $(Cr(NH_2)_4\ Cl_2)$

9. Explain the following :—
   (a) Inner transition elements   (b) Molarity
   (c) d-block elements   (d) Mole fraction

10. Why d-block elements are called transition elements ? Explain the characteristics of 3d-block elements on the following basis :—
    (a) Colour   (b) Magnetic Properties
    (c) Complex Compounds formation.

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Time : 3.00 Hrs.   **Full Marks : 80**

Answer any *Five* Questions. Question No.1 is compulsory.
All questions carry equal marks.

1. Select the correct option in each of the following. Each part of the questions carries 1 mark.

    (a) A dimensionless quantity :—
    (i)   never has a unit   (ii) always has a unit
    (iii) may have a unit   (iv) None of these

    (b) The magnitude of the vector product of two vectors is a :—
    (i)   Scalar   (ii) Vector
    (iii) either Scalar or Vector   (iv) None of these

    (c) Let the angle between Two non zero vectors A & B is 120° and its resultant C, then :—
    (i)   C must be equal to $|A - B|$ (ii) C must be less than $|A - B|$

    (iii) C must be greater than $|A - B|$ (iv) C may be equal to $|A - B|$

    (d) A stone is released from an elevator going up with an acceleration 'a'. The acceleration of the stone after the release is :—
    (i)   a upward   (ii) (g – a) downward
    (iii) (g – a) upward   (iv) g downward

    (e) Which one set can enter into the list of fundamental quantities in any system of units :—
    (i)   length, mass and velocity   (ii) length, time and velocity
    (iii) mass, time and velocity   (iv) length, time and mass

    (f) An object may have :—
    (i)   Varying speed without varying velocity   (ii) Varying velocity without varying speed
    (iii) non zero acceleration without varying velocity (iv) None zero acceleration without

    (g) Consider the motion of the tip of the minute hand of a clock. In one hour :—
    (i)   the displacement is zero   (ii) the distance covered is zero
    (iii) the average speed is zero   (iv) the average velocity is zero

    (h) A motor car is going due north at a speed of 50 km/h. It makes a 90° left turn without changing the speed. The change in the velocity of the car is about :—
    (i)   50 km/h towards west   (ii) 70 km/h towards south-west
    (iii) 70 km/h towards north-west   (iv) Zero

    (i) A body of wt. W_1 is suspended from the ceiling of a room through a chain of wt. W_2. The ceiling pulls the chain by a force :—

    (i) W_1 (ii) W_2 (iii) $W_1 + W_2$ (iv) $\dfrac{W_1 + W_2}{2}$

    (j) The thermal conductivity of a nod depends on
    (i)   length   (ii) mass   (iii) area of cross section   (iv) material of the rod

    (k) If heat is expressed in Jule, the mechanical equivalent of heat is :—
    (i)   1   (ii) 4.2   (iii) 4.2 Joule   (iv) 1 Joule

    (l) Newton's law of cooling is a special case of :—
    (i)   Kirchhoff's law   (ii) Plande's law
    (iii) Stenfen's law   (iv) Wein's displacement law

    (m) The amplitude of a sin wave at t = 0 is :—

    (i)   Zero   (ii) '1'   (iii) $\dfrac{1}{2}$ (iv) $\dfrac{1}{V_2}$

(n) A sin wave is travelling in a medium. The minimum distance between the two particles having some speed is :—

(i) $\dfrac{\lambda}{4}$ (ii) $\dfrac{\lambda}{2}$ (iii) $\dfrac{\lambda}{3}$ (iv) λ

(o) A mechanical wave propagates in a medium along the x-axis. The particle of the medium :—
   (i) must move on the x-axis   (ii) must move on the y-axis
   (iii) may move along x-axis   (iv) may move on y-axis

(p) When you speak to your friend, which of the following parameters have a unique value in the sound produced :—
   (i) Frequently   (ii) Wavelength   (iii) Amplitude   (iv) Wave Velocity

2. Discuss the perfectly elastic collision of two bodies moving along the x-axis.

3. Derive the expression for the force on a particle moving along a circle. Explain the direction of the force.

4. A projectile is projected with velocity v at an angle θ with the horizontal. Derive the formula for the 'maximum height; and the time of flight.

5. Define coefficient of viscosity. Derive Poiseullie's equation. How is the Viscocity of water determined on its basis ?

6. Describe the construction and theory of a constant volume hydrogen gas the thermometer.

7. Derive an expression for the pressure of gas on the basis of the assumptions of K.T.G.

8. Write the differential equation of motion of S.H.M. and solve the equation to find the velocity and the displacement.

9. Write Newton's formula for the speed of sound and then use Laplace's correction for the final formula.

10. Derive the expression for the excess pressure inside (a) a liquid drop, (b) a soap bubble.

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Programme of I.Sc. Part-I Counselling and Practical Exam' 2022

Venue : For Botany - 1st Floor, Bio Lab, Biscomaun Tower, Patna
For Chemistry - 4th Floor, Chemistry Lab, Biscomaun Bhawan, Patna
For Physics - 1st Floor, Physics Lab, Biscomaun Tower, Patna

Practical Counselling

Date	Time	
	09.00 AM to 12.00 Noon	12.30 PM to 3.30 PM
21.08.2022	Botany [Biology, Paper-I] [All Students]	—
25.08.2022	—	Chemistry [All Students]
01.09.2022	Physics [All Students]	—

Practical Examination

Date	Time	
	09.00 AM to 12.00 Noon	12.30 PM to 3.30 PM
25.08.2022	Botany [Biology, Paper-I] [All Students]	—
26.08.2022	—	Chemistry [All Students]
02.09.2022	Physics [All Students]	—

Nalanda Open University
Annual Exam-2023
Intermediate of Science (I.Sc.), Part-I
Botany, Paper-I

Time: 3.00 Hrs.   **Full Marks: 80**

Answer any **Five** Questions. Question No.1 is compulsory. All questions carry equal marks.

1. Select the correct answer in the following questions:-

    (i) Which organelle possesses circular DNA?

         (a) Chloroplast   (b) Lysosome   (c) Ribosome   (d) Golgi apparatus

    (ii) Each granum possesses how many thylakoids?

         (a) 10-100   (b) 90-93   (c) 19-89   (d) 19-38

    (iii) The reaction of Krebs cycle occurs in:

         (a) Cytoplasm   (b) Mitochondria   (c) Nucleus   (d) **All of these**

    (iv) CO_2 acceptor in C_3 plant is :

         (a) RUDP   (b) PEP   (c) PGA   (d) OAA

    (v) In some bacteria, the outer most layer loose sheath is called as:

         (a) Slime layer   (b) Capsule   (c) Cell membrane   (d) Glycocalyx

    (vi) Replication of DNA is brought about by an enzyme called:

         (a) Oxidase   (b) Kinase   (c) Reductase   (d) Polymerase

    (vii) Genes are composed of :

         (a) DNA and RNA   (b) DNA only   (c) RNA only   (d) Protein

    (viii) Leaf is modified to pitcher in :

         (a) *Nepenthes*   (b) *Utricularia*   (c) *Dionaea*   (d) *Drosera*

    (ix) One required for chlorophyll synthesis is:

         (a) Fe and Mg   (b) Fe and Co   (c) Cu and Ca   (d) Mg and Ca

    (x) To which family does sunflower belong?

         (a) Solanaceae   (b) Brassicaceae   (c) Fabaceae   (d) Asteraceae

    (xi) The field of Botany concerned with the study of living activities and function is :

         (a) Physiology   (b) Cytology   (c) Genetics   (d) Ecology

    (xii) In plant which one is responsible for guttation?

         (a) Root pressure   (b) Photosynthesis   (c) Transpiration   (d) Osmosis

    (xiii) The binomial nomenclature was proposed by:

         (a) Hugo de Vries   (b) Mendel

         (c) Carolus Linnaeus   (d) Darwin

    (xiv) The transport of sap from root to top of dicot plant is:

         (a) Transport   (b) Translocation   (c) Ascent of sap   (d) All the above

(xv)   Sweet potato is a modification of :

    (a)   Primary root   (b) Leaf

    (c)   Adventitious root   (d) Underground root

(xvi)   Which one of the following statement is correct ?

    (a)   Some viruses contain DNA and some RNA

    (b)   All viruses contain DNA

    (c)   Viruses do not contain nucleic acid

    (d)   All viruses contain RNA

2. Describe the floral characters of the family Solanaceae. Give the floral formula and floral diagram. Also write the botanical name of two plants of economic importance of the family.

3. Describe the structure of bacteriophage

<p align="center">Or</p>

Describe the structure and function of Endoplasmic reticulum.

4. Write notes on any **two** of the following:

    (a)   Economic importance of Bacteria

    (b)   Mycoplasma

    (c)   Conjugation

    (d)   Vivipary

    (e)   Important cereal crops of Bihar

5. Describe the structure and function of lysosome

6. Describe the secondary growth in dicot stem.

7. Give an account of Calvin cycle.

8. Describe prophase I of meiosis.

9. Mention the sources of water pollution and suggest the methods of its control.

10. Write short notes on any **two** of the following:

    (a)   Prokaryotic cell

    (b)   Stomatal movement

    (c)   Carbon cycle or Green House Effect

    (d)   Cell cycle

<p align="center">● ● ●</p>

Programme of I.Sc. Part-I Counselling and Practical Exam' 2023

Venue   :   For Botany - 1st Floor, Bio Lab, Biscomaun Tower, Patna
For Chemistry - 4th Floor, Chemistry Lab, Biscomaun Bhawan, Patna
For Physics - 1st Floor, Physics Lab, Biscomaun Tower, Patna

Practical Counselling

Date	Time		
	09.00 AM to 11.00 AM	**11.00 AM to 02.00 PM**	**02.30 PM to 05.30 PM**
28.03.2023	**Botany [All Students] [Biology, Paper-I]**	**Chemistry [All Students]**	**Physics [All Students]**

Practical Examination

Date	Time	
	10.00 AM to 01.00 PM	**02.00 PM to 05.00 PM**
31.03.2023	**Botany [All Students] [Biology, Paper-I]**	**Chemistry [All Students]**
01.04.2023	**Physics [All Students]**	

Nalanda Open University
Annual Exam - 2023
Intermediate of Science (I.Sc.), Part-II
Mathematics, Paper-II

Time: 3.00 Hrs.   Full Marks: 80

Answer any Five Questions. Question No.1 is compulsory.
All questions carry equal marks.

1. Select the correct answer from the following questions. Each part of the questions carries one mark.

   (a) $\displaystyle \lim_{x \to 0} \frac{\tan x - \sin x}{x^2}$ *is :*

      (i) $\dfrac{1}{2}$ (ii) $-\dfrac{1}{3}$ (iii) $\dfrac{1}{3}$ (iv) None of these

   (b) *If f(x)* $= |x|$ *then f is continuous at :*

      (i) origin   (ii) at $x = +1$ (iii) $x = -1$ (iv) None of these

   (c) If $x > 0, y > 0$ and $xy = 1$, then the minimum value of $x + y$ is :

      (i) 1   (ii) $\dfrac{1}{2}$ (iii) 4   (iv) None of these

   (d) $\displaystyle \lim_{x \to 0} \left(\frac{\tan x}{x} \right)^{\frac{1}{x^2}}$ *is :*

      (i) $e^{\frac{1}{3}}$ (ii) $e^{\frac{1}{2}}$ (iii) e (iv) None of these

   (e) $\displaystyle \int_{2}^{3} \frac{\sqrt{x}}{\sqrt{5-x} + \sqrt{x}} dx$ is :

      (i) ½   (ii) 3   (iii) 5   (iv) None of these

   (f) *If* $x = a(t + \sin t), y = a(1 - \cos t)$ *then* $\dfrac{dy}{dx}$ *is :*

      (i) $\sin \dfrac{t}{2}$ (ii) $\cos \dfrac{t}{2}$ (iii) $\tan\left(\dfrac{t}{2} \right)$ (iv) None of these

   (g) The order and degree of the differential equation $\dfrac{d^2 y}{dx^2} = \sqrt{1 + \left(\dfrac{dy}{dx} \right)^2}$ is :

      (i) 1, 1   (ii) 2, 2   (iii) 2, 1   (iv) None of these

   (h) $\displaystyle \int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$ is equal to :

      (i) $-2\cos \sqrt{x}$ (ii) $2\cos \sqrt{x}$ (iii) $\cos \sqrt{x}$ (iv) None of these

   (i) The function $f(x) = 2x^3 + 21x^2 - 60x + 41$ is strictly positive in the interval :
      (i) $(-1, \infty)$ (ii) $(1, 2)$ (iii) $(1, \infty)$ (iv) None of these

   (j) *The area bounded by the curve* $y = x$, x – *axis and the ordinates* $x = -1, x = 2$ *is :*
      (i) $\dfrac{5}{2}$ *sq. units*   (ii) $\dfrac{1}{2}$ *sq. units*   (iii) $\dfrac{3}{2}$ *sq. units*   (iv) None of these

   (k) The rate of change of area of a circle with respect to the radius r at $r = 6$ cm is :
      (i) 12π cm   (ii) 11π cm   (iii) 10π cm   (iv) None of these

   (l) *The solution of the differential equation* $\dfrac{dy}{dx} = \dfrac{1 + y^2}{1 + x^2}$ *is :*
      (i) $y - x = c(1 + xy)$ (ii) $x - y = c(1 + xy)$ (iii) $y - x = c(1 - xy)$ (iv) None of these

   (m) If $\left| \vec{a} + \vec{b} \right| = \left| \vec{a} - \vec{b} \right|$ then the angle between $\vec{a}$ and $\vec{b}$ is :
      (i) 30°   (ii) 60°   (iii) 90°   (iv) None of these

See Back Page

(n) If A is a square matrix such that $A^2 = A$ then $(1 + A)^3 - 7A$ is equal to :
  (i) A (ii) $1 - A$ (iii) 1 (iv) None of these

(o) *If three vectors* $\vec{i} - \vec{j} + \vec{k}$, $2\vec{i} + \vec{j} - \vec{k}$ *and* $\lambda\vec{i} - \vec{j} + \vec{k}$ *are co-planar, then the value of* λ *is:*
  (i) *1* (ii) *2* (iii) *3* (iv) None of these

(p) *A bag contains 9 red, 4 black, 7 white balls. The probability that a ball drawn is not black is :*
  (i) $\dfrac{13}{20}$ (ii) $\dfrac{16}{20}$ (iii) $\dfrac{11}{20}$ (iv) None of these

2. If $f(x) = \begin{cases} x - 1 & when \quad x < 0 \\ \dfrac{1}{4} & when \quad x = 0 \\ x^2 & when \quad x > 0 \end{cases}$, then discuss the continuity of $f(x)$ at $x = 0$.

3. *If* $\sqrt{1 - x^2} + \sqrt{1 - y^2} = a(x - y)$ then show that $\dfrac{dy}{dx} = \sqrt{\dfrac{1 - y^2}{1 - x^2}}$.

4. (a) Prove that the maximum value of $\left(\dfrac{1}{x}\right)^x$ is $e^{\frac{1}{e}}$.

    (b) Find the interval of monotonicity of $x\log_e^x$.

5. Evaluate : (i) $\displaystyle\int_0^{\frac{\pi}{2}} \dfrac{\sin^2 x \; dx}{\sin x + \cos x}$ (ii) $\displaystyle\int_0^{a} \sqrt{a^2 - x^2}\, dx$

6. Evaluate : (i) $\displaystyle\int \dfrac{dx}{4 + 5\,Cos x}$ (ii) $\displaystyle\int \dfrac{dx}{x^2 + 5x + 6}$

7. Find the area included between the curves $x^2 = 4y$ and $y^2 = 4x$.

8. Solve : (i) $\dfrac{dy}{dx} = \dfrac{3x - 4y + 2}{4x - 5y + 3}$ (ii) $\left(\dfrac{dy}{dx}\right)^2 - (e^{-x} + e^x)\dfrac{dy}{dx} + 1 = 0$

9. Solve (i) $\dfrac{dy}{dx} + \dfrac{y}{x} = e^x \; (x > 0)$ (ii) $\left(x^2 + xy\right)dy = \left(x^2 + y^2\right)dx$.

10. (i) Find the sine of the angle between the vectors $\vec{a} = 2\vec{i} - \vec{j} + 3\vec{k}$; $\vec{b} = \vec{i} + 3\vec{j} + 2\vec{k}$.
   (ii) Prove that : $\vec{a} \times \left(\vec{b} \times \vec{c}\right) + \vec{b} \times \left(\vec{c} \times \vec{a}\right) + \vec{c} \times \left(\vec{a} \times \vec{b}\right) = \vec{0}$.

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Programme of I.Sc. Part-II Practical Counselling and Practical Exam' 2023

Venue : For Zoology - 1st Floor, Bio Lab, BiscomaunTower, Patna
  For Chemistry - 4th Floor, Chemistry Lab, Biscomaun Bhawan, Patna
  For Physics - 1st Floor, Physics Lab, BiscomaunTower, Patna

Practical Counselling

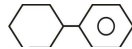| Date	Time	
	10.30 AM to 1.30 PM	2.00 PM to 5.00 PM
12.04.2023	Chemistry [All Students]	Zoology [Biology, Paper-II] [All Students]
13.04.2023	Physics [All Students]	—

Practical Examination

Date	Time	
	11.00 AM to 2.00 PM	2.30 PM to 5.30 PM
13.04.2023	—	Zoology [Biology, Paper-II] [All Students]
15.04.2023	Chemistry [All Students]	Physics [All Students]

Time: 3.00 Hrs.   Full Marks: 80

Answer **Five** Questions in all, selecting atleast Two Questions from each Group.
Question No.1 is compulsory. All questions carry equal marks.

1. Choose the correct answer in the following :-
    (i)   Type of hybridisation of carbon in ethane is :—
          (a) SP^3 (b) SP^2
          (c) SP (d) SP^3d

    (ii) Most electronegative element is :—
          (a) Li   (b) Na
          (c) K   (d) Ca

    (iii) CH_3OCH_3 and $CH_3 CH_2 OH$ are isomers :—
          (a) Position   (b) Chain
          (c) Functional   (d) Metamers

    (iv) IUPAC name of $CH_3 - CH = CH - C \equiv CH$:—
          (a) Pent-3-ene-1-yne   (b) Pent-4-yne-2-ene
          (c) Pent-1-yne-3-ene   (d) But-1-ene-3-yne

    (v)   Which of the following is not electrophilic :—
          (a) BF_3 (b) Cu^{2+}
          (c) $AlCl_3$ (d) NH_3

    (vi) The Compound
          (a) Hexyl benzene   (b) Cyclohexyl benzene
          (c) Phenyl benzene   (d) Cyclopentyl benzene

    (vii) Which exhibits position isomerism ?
          (a) Alkanes   (b) Alkenes
          (c) Aldehydes   (d) Mono carboxylic acid

    (viii) No. of π -bonds in $CH_3 - CH = CH - C \equiv C - H$ is :—
          (a) 3   (b) 1
          (c) 2   (d) 4

GROUP - A

2. Explain the following :—
    (a) Hess Law of constant Heat summation
    (b) First Law of Thermodynamics

3. Explain the following :—
    (a) Internal Energy
    (b) Bond Energy
    (c) Intensive and Extensive property

4. Write notes on any **Two** of the following :—
    (a) Heat of Neutralisation
    (b) Entropy
    (c) second Law of Thermodynamics

5. What is Law of mass action ? Explain common ion effect with examples.

GROUP - B

6. Write short notes on any **Two** of the following :—
   (a) Inductive effects
   (b) Electromeric effect
   (c) Metamerism

7. (a) What is Alcohol ?
   (b) Write two differences between Primary, Secondary and Tertiary alcohol.
   (c) Write the reaction of the following with C_2H_5OH :–
       (i) Pcl$_5$ (ii) Socl$_2$ (iii) H_2SO_4

8. Give the reason :—
   (a) Phenol is stronger acid than ethyl alcohol.
   (b) Formic acid is more acidic than acetic acid.
   (c) Methyl amine is more basic than Ammonia.
   (d) Dimethyl amine is more basic than trimethyl amine.

9. How will you convert :—
   (a) Methane to ethane.
   (b) Ethyl Iodide to ethyl alcohol.
   (c) Ethyl alcohol to ethene.
   (d) Ethyl alcohol to ethenoic acd.

10. (a) Write a difference between primary, secondary and tertiary amine on the basis of chemical reaction.
    (b) How Benzene is prepared by cyclic polymerization ?

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Programme of I.Sc. Part-II Practical Counselling and Practical Exam' 2023

Venue   :   For Zoology - 1st Floor, Bio Lab, BiscomaunTower, Patna
For Chemistry - 4th Floor, Chemistry Lab, Biscomaun Bhawan, Patna
For Physics - 1st Floor, Physics Lab, BiscomaunTower, Patna

Practical Counselling

Date	Time	
	10.30 AM to 1.30 PM	**2.00 PM to 5.00 PM**
12.04.2023	Chemistry [All Students]	Zoology [Biology, Paper-II] [All Students]
13.04.2023	Physics [All Students]	—

Practical Examination

Date	Time	
	11.00 AM to 2.00 PM	**2.30 PM to 5.30 PM**
13.04.2023	—	Zoology [Biology, Paper-II] [All Students]
15.04.2023	Chemistry [All Students]	Physics [All Students]

NALANDA OPEN UNIVERSITY
Intermediate of Science (I.Sc.), Part-II
Zoology, Paper-II
Annual Examination, 2023

Time: 3.00 Hrs. Full Marks: 80

Answer any **Five** Questions. Question No.1 is compulsory. All questions carry equal marks.

1. Multiple Choice questions. Each question carries two marks.

   (i) How many pairs of cranial nerves are found in rabbit:
   - (a) Twelve
   - (b) Ten
   - (c) Eleven
   - (d) Nine

   (ii) Mammalian heart is:
   - (a) 2 - chambered
   - (b) Single chambered
   - (c) 4 - chambered
   - (d) 3 -chambered

   (iii) Theory of natural selection was given by:
   - (a) Wallace
   - (b) Weismann
   - (c) Darwin
   - (d) Lamark

   (iv) Which of the following endocrine glands secrete glucagon:
   - (a) Thyroid
   - (b) Pituitary
   - (c) Islets of Langerhans
   - (d) Adrenal

   (v) Syncytial epidermis if found in:
   - (a) Ascaris
   - (b) Metaphire
   - (c) Housefly
   - (d) Periplaneta

   (vi) Ascaris lumbricoides is found in the intestine of:
   - (a) Pig
   - (b) Homo sapiens
   - (c) Monkey
   - (d) Goat and sheep

   (vii) Glucose is stored as glycogen in:
   - (a) Intestine
   - (b) Liver
   - (c) Kidney
   - (d) Spleen

   (viii) Leydig cells are found in:
   - (a) Ovary
   - (b) Alkenes
   - (c) Testis
   - (d) Vasdeferens

2. Describe the structure and function of DNA.

3. Give an account of the ultrastructure and function of mitochondria.

4. Classify phylum porifera up to classes with characters & examples.

5. Describe the structure and classification of carbohydrates.

6. Give an account of mouth parts of Cockroach.

7. Describe the structure and function of Thyroid gland.

8. Write an essay on Variation.

9. Describe the respiratory system of Frog.

10. Write notes on any **two** of the following:
    - (a) Natural selection
    - (b) Kala-azar
    - (c) Conjugation in paramecium
    - (d) Gametogenesis

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See Practical Counselling & Examination Programme on Back Page

Programme of I.Sc. Part-II Practical Counselling and Practical Exam' 2023

Venue : For Zoology - 1st Floor, Bio Lab, BiscomaunTower, Patna
For Chemistry - 4th Floor, Chemistry Lab, Biscomaun Bhawan, Patna
For Physics - 1st Floor, Physics Lab, BiscomaunTower, Patna

Practical Counselling

Date	Time	
	10.30 AM to 1.30 PM	**2.00 PM to 5.00 PM**
12.04.2023	Chemistry [All Students]	Zoology [Biology, Paper-II] [All Students]
13.04.2023	Physics [All Students]	—

Practical Examination

Date	Time	
	11.00 AM to 2.00 PM	**2.30 PM to 5.30 PM**
13.04.2023	—	Zoology [Biology, Paper-II] [All Students]
15.04.2023	Chemistry [All Students]	Physics [All Students]

Nalanda Open University
Annual Exam - 2023
Intermediate of Science (I.Sc.), Part-II
Physics, Paper-II

Time: 3.00 Hrs.   Full Marks: 80

Answer any *Five* Questions. Question No.1 is compulsory. All questions carry equal marks.

1. Select the correct option in each of the following. Each question carries 1 mark.

   (i) If the angle of incidence in less than its limiting value, then rays are :
   - (a) partially reflected
   - (b) partially refracted
   - (c) totally reflected
   - (d) totally refracted

   (ii) If focal length (*f*) is in cm., then power is expressed as
   - (a) $\dfrac{1}{f}$
   - (b) f
   - (c) $\dfrac{1000}{f}$
   - (d) $\dfrac{100}{f}$

   (iii) If the sign and radius of curvature of both side of a lens is the same, what will be its power:
   - (a) Infinite
   - (b) $\dfrac{1}{f}$
   - (c) f
   - (d) None of these

   (iv) If D and f are the least distance of distinct vision and the focal length, respectively, then the magnifying power of a glass is :
   - (a) $1+\dfrac{D}{f}$
   - (b) $\dfrac{D}{f}$
   - (c) $1-\dfrac{D}{f}$
   - (d) $\dfrac{f}{D}$

   (v) wave fronts coming from distant source are nearly :
   - (a) spherical
   - (b) elliptical
   - (c) plane
   - (d) cylindrical

   (vi) The sources are called coherent if they produce waves :
   - (a) of equal wavelength
   - (b) of equal velocity
   - (c) having same shape
   - (d) having constant phase difference

   (vii) The number of fringes formed due to interference and diffraction are :
   - (a) same
   - (b) larger in interference
   - (c) larger in diffraction
   - (d) lesser in interference

   (viii) Unit pole in S.I. unit is that pole which when placed at a distance of 1 meter from a similar pole is repelled by a force of :
   - (a) 10^{-7} weber/amp
   - (b) 10^{-7} henery
   - (c) 10^{-7} N
   - (d) 10^{-7} N/A^2

   (ix) If a magnet is suspended freely in a uniform magnetic field, then its time period is :
   - (a) $\dfrac{I}{MD}$
   - (b) $2\pi\dfrac{\sqrt{I}}{MB}$
   - (c) $2\pi\sqrt{\dfrac{I}{MB}}$
   - (d) $2\pi\sqrt{\dfrac{MB}{I}}$

   (x) 1 coulomb is equal to
   - (a) 1 ab coulomb
   - (b) 1×10^{9} stat coulomb
   - (c) 3×10^{10} stat coulomb
   - (d) None of these

   (xi) Magnetic meridian is :
   - (a) a point
   - (b) a horizontal line
   - (c) a line along north-south
   - (d) a vertical line

   (xii) A uniform wire of 50Ω is cut into 5 equal parts. It is than connected in parallel connection. The equivalent resistance is
   - (a) 250Ω
   - (b) 2Ω
   - (c) 10Ω
   - (d) 6250Ω

   (xiii) A vertical wire carries a current in upward direction. An electron beam sent horizontally towards the wire will be deflected.
   - (a) towards right
   - (b) towards left
   - (c) upward
   - (d) downward

(xiv) If the current is doubled, the deflection is also doubled in :
     (a)   a tangent galvanometer   (b)   a moving coil galvanometer
     (c)   both   (d)   None

(xv) The K.E. of an electron of charge e moving round the nucleus of radius r is :

     (a) $\dfrac{Ze^2}{4\pi\varepsilon_0 r^2}$ (b) $\dfrac{Ze^2}{4\pi\varepsilon_0 r}$ (c) $\dfrac{Ze^2}{8\pi\varepsilon_0 r}$ (d) $\dfrac{Ze^2}{8\pi\varepsilon_0 r^2}$

(xvi) A de-Brogli wave associated with a particle of mass m and velocity v has a wavelength equal to :
     (a) h/mv (b) m^v/h (c) hmv (d)   C

2. Derive Snell's law of refraction on the basis of wave theory of light.

3. Establish the relation $\mu = Sin\dfrac{A+\delta m}{2} / Sin\dfrac{A}{2}$.

4. Discuss deviation without dispersion and dispersion without deviation produced by a combination of prisms.

5. State and explain Gauss law. Find electric field near an infinite plane sheet of charge having uniform surface charge density.

6. State and explain Kirchoff's laws and Their application to find the balanced condition of wheat stone bridge.

7. Describe the construction and action of a moving coil galvano meter. Explain how it can be converted into a ammeter?

8. What is a *p-n* junction ? Define its dynamic resistance.

9. Give Einstein theory to explain photoelectric effect. Explain threshold rectifier of alternating wave.

10. What is Bohr's model of atom? Discuss the model to explain the series spectra of Hydrogen atom.

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Programme of I.Sc. Part-II Practical Counselling and Practical Exam' 2023

Venue :   For Zoology - 1st Floor, Bio Lab, BiscomaunTower, Patna
             For Chemistry - 4th Floor, Chemistry Lab, Biscomaun Bhawan, Patna
             For Physics - 1st Floor, Physics Lab, BiscomaunTower, Patna

Practical Counselling

Date	Time	
	10.30 AM to 1.30 PM	2.00 PM to 5.00 PM
12.04.2023	Chemistry [All Students]	Zoology [Biology, Paper-II] [All Students]
13.04.2023	Physics [All Students]	—

Practical Examination

Date	Time	
	11.00 AM to 2.00 PM	2.30 PM to 5.30 PM
13.04.2023	—	Zoology [Biology, Paper-II] [All Students]
15.04.2023	Chemistry [All Students]	Physics [All Students]