Nalanda Open University

Annual Exam - 2015

Intermediate of Science (I.Sc.), Part-I

Mathematics, 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 from the following question. Each part of the questions carry one mark.

(a) Let the universal set is U = R then $\{0\}^C$ is :

(i) $\{x : x = 0, x \in R\}$ (ii) R^+

(iii) R^- (iv) $[0,\infty]$

(b) Let X be the set of triangle and R is relation of becoming issoscles. Then, R is :

(i) not equivalence relation (ii) reflexive relation only

(iii) sysmmetric and reflexive (iv) transitive only

(c) If $x = a + b$, $y = a\omega + b\omega^2$, $z = a\omega^2 + b\omega$, then $x^3 + y^3 + z^2$ equals :

(i) $6ab$ (ii) $3(a^3 + b^3)$ (iii) $3(a^2 + b^2)$ (iv) $a^3 + b^3$

(d) If the same number is added to each term of an A.P., then the resulting sequence becomes :

(i) H.P

(ii) remains A.P

(iii) depends nature on the number

(iv) G.P

(e) The solution set of the equation $x^2 - ix + 6 = 0$, is :

(i) $\{3i, 2i\}$ (ii) $\{3i, 2i\}$ (iii) $\{-2i, -3i\}$ (iv) $\{2i, -3i\}$

(f) The number of ways 8 Indians and 8 Pakistanis can set down a reserved table so that no two Indians are together, is :

(i) $\lfloor 7 \times \lfloor 8$ (ii) $\lfloor 7 \times \lfloor 7$ (iii) $\lfloor 7 \times \lfloor 9$ (iv) $\lfloor 9 \times \lfloor 9$

(g) The sum of the series $1 + 2x + 3x^2 + 4x^3 + \ldots\ldots\ldots\ldots$ to ∞ :

(i) $\frac{1}{1+x}$ (ii) $\frac{1}{1-x}$ (iii) $\frac{1}{(1+x)^2}$ (iv) $\frac{1}{(1-x)^2}$

(h) Cramer's rule is applied to solve :

(i) any sysyem of equations

(ii) second degree system of equations

(iii) linear system of equations

(iv) linear system of equations under restricted condition

(i) In a triangle ABC, $\tan\frac{A}{2}\tan\frac{B}{2}\tan\frac{C}{2}\tan\frac{A}{2}$ equals :

(i) 0 (ii) 1 (iii) ½ (iv) 2

(j) For any $x \in R$ the identity $\tan^{-1}x + \cot^{-1}x$ equals :

(i) $\frac{\pi}{2}$ (ii) π (iii) 2π (iv) $\frac{\pi}{4}$

(k) In any triangle ABC, $\text{Cos}\frac{A}{2}$ equals :

(i) $\sqrt{\frac{s(s-a)}{bc}}$ (ii) $\sqrt{\frac{(s-a)(s-b)}{bc}}$ (iii) $\frac{s(s-a)}{2bc}$ (iv) $\frac{\sqrt{(s-a)(s-b)}}{2bc}$

See Back Page

(l) The condition for Colliverity of three points A(x_1, y_1), B(x_2, y_2) and C(x_3, y_3) is $\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$ equals :

(i) 0 (ii) 1 (iii) – 1 (iv) ½

(m) The equation of a line parallel to a given line $lx + my + n = 0$ and passing through the point (α, β) is :

(i) $mx - ly = m\alpha - l\beta$ (ii) $mx + ly = m\alpha + l\beta$

(iii) $\alpha(lx + my) + \eta\beta = 0$ (iv) $\alpha(lx + my) - \beta\eta = 0$

(n) The points (1, 1) and (2, –1) are located with regard to the lines $3x + 4y - 6 = 0$ in the :

(i) same side (ii) opposite sides

(iii) on the line (iv) none of these

(o) The condition that tyhe line $y = mx + c$ will touch the circle $x^2 + y^2 = a^2$ is :

(i) $c^2 = a^2 (1 + m^2)$ (ii) $c^2 = 1 + m^2$

(iii) $c = \pm a$ (iv) $c^2 (1 + m^2) = a^2$

(p) The vertex of the porabola $y^2 - 3x - 2y + 7 = 0$ is the point :

(i) (0, 0) (ii) (2, 1) (iii) (1, 2) (iv) (2, –1)

2. Let A and B have 5 and 9 elements. Determine the minimum number of elements in A ∪ B.
3. Find the range and domain of the function $f(x) = \frac{x}{1+x^2}$.
4. Prove that every complex number has two square roots.
5. The A.M of two numbers exceed G.M by $\frac{3}{2}$ and G.M exceeds H.M by $\frac{6}{5}$. Find the numbers.
6. How many triangles can be formed by joining 12 points so that 7 are Collinear.
7. If $\alpha + \beta = \gamma$, then show that $\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1 + 2\cos\alpha\cdot\cos\beta\cdot\cos\gamma$.
8. Sow that the locus of the points of intersection of tangents to an ellipse at two points whose eccentirc angles differ by a constant, is an ellipse.

✦ ✦ ✦

Examination Programme, 2015

I.Sc. Part – I

Date	Papers	Time	Examination Centre
10/2/2015	Hindi or English Language & Literature Paper – I	8 to11 A.M	Nalanda Open University, Patna
12/2/2015	Biology and Math Paper – I	8 to11 A.M	Nalanda Open University, Patna
14/2/2015	Chemistry Paper – I	8 to11 A.M	Nalanda Open University, Patna
16/2/2015	Physics Paper – I	8 to11 A.M	Nalanda Open University, Patna
18/2/2015	Hindi Composition 100 Marks or Hindi 50 Marks & Urdu 50 Marks	8 to11 A.M	Nalanda Open University, Patna
From 20/2/2015	Practical Counselling and Practical Examination of Biology, Chemistry and Physics	8 to11 A.M	Nalanda Open University, Patna

Nalanda Open University

Annual Exam-2015

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) Small pox is caused by :
(a) Bacteria (b) Protozoa (c) Fungi (d) Virus

(ii) Stipule is the part of :
(a) Seed (b) Stem (c) Leaf (d) Flower

(iii) Chloroplast is cup shaped in :
(a) *Spirogyra* (b) *Nostoc*
(c) Bryophytes (d) *Chlamydomonas*

(iv) A cell increased in volume when placed in a solution which one is?
(a) Hypotonic (b) Isotonic (c) Hypertonic (d) All of these

(v) The reaction of Krebs cycle occurs in :
(a) Cytoplasm (b) Mitochondria (c) Nucleus (d) All of these

(vi) CO_2 acceptor in C_3 plant is :
(a) RUDP (b) PEPA (c) PGA (d) OAA

(vii) As per template theory amino acid first combines with :
(a) DNA (b) mRNA (c) sRNA (d) tRNA

(viii) Replication of DNA is brought about by an enzyme called :
(a) Oxidase (b) Kinase (c) Reductase (d) Polymerase

(ix) Genes are composed of :
(a) DNA and RNA (b) DNA only
(c) RNA only (d) Protein

(x) Leaf is modified to pitcher in :
(a) *Nepenthes* (b) *Utricularia* (c) *Dionaea* (d) *Drosera*

(xi) Number of stamens in Solanaceae is :
(a) 10 (b) 5 (c) ∞ (d) 6

(xii) To which family does sunflower belong?
(a) Solanaceae (b) Brassicaceae (c) Fabaceae (d) Asteraceae

(xiii) Viruses are entirely :
(a) Saprophytic (b) Parasitic (c) Symbiotic (d) Epiphytic

(xiv) Guard cells differ from epidermal cell in having :
(a) Chloroplast (b) Vacuole (c) Cell wall (d) Hairs

(xv) Binomial nomenclature was introduced by :
(a) Carolus Linnaeus (b) Mendel
(c) Aristotle (d) Theophrastus

(xvi) Annual ring helps in detecting one of the following :
(a) Thickness of stem (b) Hardness of stem
(c) Age of plants (d) All of these

See Back Page

2. Describe the floral character of the family Brassicaceae. Give the floral formula, floral diagram and botanical name of two plants of economic importance of this family.
3. Describe the detailed structure of a bacterial cell.
4. Describe the structure and function of mitochondira.
5. Mention Krebs cycle.
6. Give an account of mitotic division of cell and write its significance.
7. Describe the sources of water pollution and suggest the methods of its control.
8. Describe the process of crossing over and discuss its significance.
9. Mention the DNA replication.
10. Write short notes on any **Four** of the following :
    (a) Annual ring
    (b) Acid rain
    (c) Cereals
    (d) Mutation
    (e) Economic importance of Cyanobacteria
    (f) Cell cycle

✦ ✦ ✦

Programme of I.Sc. Part-I Counselling and Exam' 2015

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

(A) Practical Counselling

Date	*Time*	
	11.15 AM to 2.15 PM	**2.30 PM to 5.30 PM**
20.02.2015	Botany (All Students)	—
21.02.2015	Physics (All Students)	Chemistry (All Students)

(B) Practical Examination

Date	*Time*	
	11.15 AM to 2.15 PM	**2.30 PM to 5.30 PM**
23.02.2015	Botany (All Students)	Chemistry (All Students)
24.02.2015	Physics (All Students)	—

Nalanda Open University

Annual Exam - 2015

Intermediate of Science (I.Sc.), Part-I

Chemistry, Paper-I

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

Answer any *Five* Questions. Question No.1 is compulsory. Attempt Two Questions from Group 'A' and Two Questions from Group 'B'. All questions carry equal marks.

1. Choose the correct answer in the following :-

(i) Elements having same mass number but different atomic number is called :

(a) Isotopes (b) Isotone (c) Isobar (d) None of these

(ii) Nucleous consists of :

(a) Electron (b) Electron and Proton
(c) Proton and Neutron (d) Neutron

(iii) Which of the following configuration with atomic number 24 is :

(a) $Ar(18)3d^6$ (b) $Ar(18)3d^54s^1$ (c) $Ar(18)4s^24p^4$ (d) $Ar(18)3d^44s^2$

(iv) A Lewis base :

(a) accepts protons (b) donates protons
(c) accept cone pair of electrons (d) donates lone pair of electrons

(v) The specific rate of reaction depends upon the :

(a) concentration of reactant (b) concentration of product
(c) time (d) temperature

(vi) In a chemical reaction catalyst is added to change the :

(a) activation (b) heat of reaction
(c) find product (d) equilibrium

(vii) When a radio active substance is subjected to vacume, the rate of disintegration :

(a) is not affected (b) reduces to zero
(c) increases (d) decreases

(viii) Cinnabar is the ore of :

(a) Zinc (b) Mercury (c) Copper (d) Silver

Group - A

2. What is meant by hybridization? Write down the shape of sp, sp^2, sp^3 hybridization. Arrange these in order of decreasing bond angle.

3. What is the constitution of nucleus? Explain its stability by giving three its theories.

4. Define Lawis acid and Lais base. Explain your answer with suitable examples.

5. Define spectrum. Define spectrum of hydrogen.

See Back Page

6. Write short notes on following :
   (a) Pauli's Exclusion Principle
   (b) Radioactivity
   (c) Aufbau Principle

Group - B

7. How is ammonia manufactured by Habar's process. How does ammonia react with heated copper and red hot platinum.

8. Explain the following terms with reference to the periodic table :
   (a) Diagonal relationship
   (b) Transition metals
   (c) Typical element
   (d) Representative elements

9. Define the terms with examples :
   (a) Flux
   (b) Slag
   (c) Gague
   (d) Concentration of ores
   (e) Roasting

10. What do you understand by water pollution? What are its main pollutants? What are effect on human health.

✦ ✦ ✦

Programme of I.Sc. Part-I Counselling and Exam' 2015

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

(A) Practical Counselling

Date	*Time*	
	11.15 AM to 2.15 PM	**2.30 PM to 5.30 PM**
20.02.2015	Botany (All Students)	—
21.02.2015	Physics (All Students)	Chemistry (All Students)

(B) Practical Examination

Date	*Time*	
	11.15 AM to 2.15 PM	**2.30 PM to 5.30 PM**
23.02.2015	Botany (All Students)	Chemistry (All Students)
24.02.2015	Physics (All Students)	—

Nalanda Open University

Annual Exam - 2015

Intermediate of Science (I.Sc.), Part-I

Physics, 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 each of the following. ach part of the question carries 1 mark.

(i) A stone is released from an elevator going up with an acceleration a. The acceleration of the stone after the release is :

(a) a upward (b) $(g - a)$ upward
(c) $(g - a)$ downward (d) g downward

(ii) A car accelerates on a horizontal road due to the force exerted by :

(a) the engine of the car (b) the driver of the car
(c) the earth (d) the road

(iii) A 1 kg mass is suspended at one end of 1 m long thread and rotated in a horizontal circle. The string can sustain a maximum weight of 1600 Newtons. Then, the maximum possible angular speed of rotation at which the thread will not break is :

(a) 80 rad/sec (b) 40 rad/sec (c) 160 rad/sec (d) 20 rad/sec

(iv) All the particles of a body are situated at a distance R from the origin. The distance of the centre of mass of the body from the origin is :

(a) = R (b) ≤ R (c) > R (d) ≥ R

(v) 64 raindrops combine to from a single drop. The ratio of the total surface energy of all the drops to that of the single drop is :

(a) 64 : 1 (b) 4 : 1 (c) 8 : 1 (d) 1 :4

(vi) Two equal drops are falling through air at a steady velocity of 5 cm/sec. If the drops coalesce, the new terminal velocity will be :

(a) 5 × 2 cm/sec (b) 5 × √2 cm/sec
(c) 5 × $(4)^{1/3}$ cm/sec (d) 5/√2 cm/sec

(vii) The quantity $\frac{pV}{kT}$ represents :

(a) mass of the gas
(b) kinetic energy of the gas
(c) number of molecules in the gas
(d) number of moles of the gas

(viii) Let C_v and C_p denote the molar specific heat capacities of an ideal gas at constant volume and constant pressure respectively. Which of the following is a universal constant?

(a) $\frac{C_p}{C_v}$ (b) C_pC_v (c) $C_p - C_v$ (d) $C_p + C_v$

(ix) Newton's law of cooling is a special case of :

(a) Wein's displacement law (b) Kirchhoff's law
(c) Stefan's law (d) Planck's law

(x) The thermal conductivity of a rod depends on :

(a) length (b) mass
(c) area of cross section (d) material of the rod

See Back Page

(xi) Two bodies A and B having equal surfaces areas are maintained at temperatures 10°C and 20°C. The thermal radiation emitted in a given time by A and B are in the ratio :

(a) 1 : 1.15 (b) 1 : 2 (c) 1 : 4 (d) 1 : 16

(xii) A sine wave is travelling in a medium. The minimum distance between the two particles, always having same speed is :

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{2}$ (d) π

(xiii) A tuning fork sends sound waves in air. If the temperature of the air increases which of the following parameters will change :

(a) displacement amplitude (b) Frequency
(c) Wavelength (d) Time period

(xiv) An organ pipe, open at both ends, contains :

(a) longitudinal stationary waves (b) longitudinal travelling waves
(c) transverse stationary waves (d) transverse travelling waves

(xv) A particle moves on the x-axis according to the equation $x = A + B \sin \omega t$. T he motion is simple harmonic with amplitude :

(a) A (b) B (c) A + B (d) $\sqrt{A^2 + B^2}$

(xvi) Which of the following quantities are always zero in a simple harmonic motion :

(a) $\vec{F} \times \vec{a}$ (b) $\vec{v} \times \vec{r}$ (c) $\vec{a} \times \vec{r}$ (d) all

2. Discuss the perfectly elastic collision of two bodies moving along the x-axis.
3. Derive the formula for 'the maximum height attained' and 'the time of flight' of a projectile projected with velocity v at an angle θ with the horizontal.
4. Derive the expression for the force on a particle moving along a circle. Explain the direction of the force.
5. What is Hooke's law? Define the various elastic constants. Find the energy stored in a stretched wire.
6. Describe the construction and theory of working of a constant volume hydrogen gas thermometer.
7. On the basis of the assumptions of the kinetic theory of gases derive an expression for the pressure of gas.
8. Discuss the effect of rise of temperature on the velocity of sound in air.
9. Starting with definition of simple harmonic equation write its differential equation of motion. Solve this equation to find velocity and displacement.
10. Derive the expression for excess pressure inside :

(a) liquid drop (b) soap bubble

✦ ✦ ✦

Nalanda Open University

Annual Exam - 2015

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 question. Each part of the questions carries one mark.

(a) The value of $\underset{x\to 0}{Lim}\frac{\log Cosx}{x}$ equals :

(i) 1 (ii) -1 (iii) 0 (iv) $\propto$

(b) $\underset{x\to a}{Lim}\frac{x^n - a^n}{x-a}$ is equal to :

(i) n (ii) 1 (iii) na^{n-1} (iv) 0

(c) The value of the $\underset{x\to 0}{Lim}\frac{(1-x)^{y_n} - 1}{x}$ equals to :

(i) n (ii) $-n$ (iii) 1 (iv) $\frac{1}{n}$

(d) In the set A = {1, 2, 3, 4, 5}, a relation R is defined by R = {(x, y) : x, $y \in$ A and $x < y$}. Then R is :

(i) Reflexive (ii) Symmetric
(iii) Transitive (iv) none of these

(e) If f : R $\to$ R be given by $f(x) = \left(8 - x^3\right)^{y_3}$, then ($f$ o f) (x) is :

(i) x^{y_3} (ii) x^3 (iii) x (iv) $3 - x^3$

(f) $\tan^{-1}\sqrt{3} - \text{Cot}^{-1}(-\sqrt{3})$ equals to :

(i) $\frac{\pi}{2}$ (ii) $-\frac{\pi}{2}$ (iii) $2\sqrt{3}$ (iv) 0

(g) If A is a square matrix such that $A^2 = A$, then $(1 + A)^3 - 7A$ equals :

(i) A (ii) $1 - A$ (iii) 1 (iv) 3A

(h) If A is a square matrix and k is a real number, then $|k\,A|$ is equal to :

(i) $k\,|A|$ (ii) $k^2\,|A|$ (iii) $k^3\,|A|$ (iv) $3k\,|A|$

(i) If $y = \log\{\log(\log x)\}$, then $\frac{dy}{dx}$ equals :

(i) $\frac{1}{\log(\log x)}$ (ii) $\frac{1}{x\log x \times \log(\log x)}$

(iii) $\frac{1}{x\log(\log x)}$ (iv) none of these

(j) The differential Coefficient of sec ($\tan^{-1} x$) with respect to x, is :

(i) $\frac{x}{\sqrt{1+x^2}}$ (ii) $\frac{1}{\sqrt{1+x^2}}$ (iii) $x\sqrt{1+x^2}$ (iv) $\frac{1}{x}\sqrt{1+x^2}$

(k) The rate of change of the area of a circle with respect to radius r at r = 6 cm, is :

(i) 12π cm (ii) 11π cm (iii) 10π cm (iv) 8π cm

See Back Page

(l) The value of $\int \frac{dx}{\sqrt{2x-x^2}}$, is :

(i) $\text{Sin}^{-1}(x-1)+C$ (ii) $\text{Sin}^{-1}(x+1)+C$

(iii) $\text{Sin}^{-1}(1-x)+C$ (iv) $-\sqrt{2x-x^2}+C$

(m) If $\int e^x\{f(x)+f'(x)\}dx = e^x \sin x$, then $f(x)$ equals to :

(i) $\text{Sin}x$ (ii) $-\text{Sin}x$ (iii) $\text{Cos}x-\text{Sin}x$ (iv) $\text{Cos}x+\text{Sin}x$

(n) The integral $\int \frac{e^{\sqrt{x}}}{\sqrt{x}}dx$ equals:

(i) $e^{\sqrt{x}}$ (ii) $\frac{1}{2}e^{\sqrt{x}}$ (iii) $2e^{\sqrt{x}}$ (iv) $\sqrt{x}\,e^{\sqrt{x}}$

(o) The value of $\int_1^3 \frac{Cos(\log x)}{x}dx$ is equal to :

(i) Sin (log 3) (ii) Cos (log 3) (iii) – Sin (log 3) (iv) –Cos (log 3)

(p) The value of the definite integral $\int_0^1 x(1-x)^{99}dx$ equals to :

(i) $\frac{1}{10010}$ (ii) $\frac{1}{10100}$ (iii) $\frac{1}{1010}$ (iv) $\frac{1}{100}$

2. Deribe the general equation of a plane.
3. Evaluate the following integrals :

(i) $\int \frac{x^2+1}{(x+1)^2}dx$ (ii) $\int \frac{dx}{\sqrt{(x-a)(b-x)}}$ where $a < b$.

4. Find the value of the integral $\int_0 \frac{Cosx\,dx}{1+Cosx+Sinx}$.
5. Find the area of the region bounded between the curves $x^2 = 4y$ and $y^2 = 4x$.
6. Solve the differential equation $x(1+y^2)\,dx - y(1+x^2)\,dy = 0$ given that $y = 0$, when $x = 1$.
7. Two cards are drawn successively with replacement from a well suffled pack of cards. Find the probability distribution of number of Jacks.
8. Prove that the argument of the quotient of two complex numbers is equal to the difference of their arguments.

✦ ✦ ✦

Examination Programme, 2015

I.Sc. Part – II

Date	Papers	Time	Examination Centre
10/2/2015	Hindi or English Language & Literature Paper – II	8 to 11 A.M	Nalanda Open University
12/2/2015	Biology or Mathematics Paper – II	8 to 11 A.M	Nalanda Open University
14/2/2015	Chemistry Paper – II	8 to 11 A.M	Nalanda Open University
16/2/2015	Physics Paper – II	8 to 11 A.M	Nalanda Open University
From 18/2/2015	Practical Counselling and Practical Examination of Biology, Chemistry and Physics	8 to 11 A.M	Nalanda Open University

Nalanda Open University

Annual Exam - 2015

Intermediate of Science (I.Sc.), Part-II

Zoology, Paper-II

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) Gametes are formed during :
   (a) Oogenesis (b) Spermatogenesis
   (c) Gametogenesis (d) Fertilization
   (ii) Leydig cells are found in :
   (a) Ovary (b) Vasa deferens (c) Testis (d) Stroma
   (iii) Mammalian heart is of :
   (a) 2 - chambered (b) 4 - chambered
   (c) Single chambered (d) 3 - chambered
   (iv) Theory of natural selection was given by :
   (a) Lamarck (b) Darwin (c) Weismann (d) Wallace
   (v) Insulin is secreted by :
   (a) Pituitary (b) Adrenal
   (c) Thyroid (d) Islets of Langerhans
   (vi) Which one is called tapworm?
   (a) Ascaris (b) Ancylostama (c) Taenia (d) Fasciola
   (vii) Glycogen is stored in :
   (a) Liver and Pancreas (b) Pancreas
   (c) Liver (d) Muscles
   (viii) Longest duration of mitosis is :
   (a) Telophase (b) Prophase (c) Metaphase (d) Anaphase
2. Write short notes on any ***two*** of the following :-
   (a) Gastrulation (b) HIV
   (c) Blood group (d) DNA finger printing
3. Describe structure and classification of protein.
4. Write an essay on variation.
5. Describe structure and function of pituitary gland.
6. Give an account of respiratory system of Cockroach.
7. Describe the digestive system of Earthworm.
8. Describe mitotic cell division in an animal cell.
9. What is tissue? Classify the different animal tissues.
10. Describe the three-germinal layers of frog in the course of its development.

✦ ✦ ✦

Programme of I.Sc. Part-II Counselling and Exam' 2015

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

(A) Practical Counselling

Date	*Time*	
	11.15 AM to 2.15 PM	**2.30 PM to 5.30 PM**
18.02.2015	Zoology (All Students)	Chemistry (All Students)
19.02.2015	Physics (All Students)	—

(B) Practical Examination

Date	*Time*	
	11.15 AM to 2.15 PM	**2.30 PM to 5.30 PM**
19.02.2015	—	Zoology (All Students)
20.02.2015	Physics (All Students)	Chemistry (All Students)

Nalanda Open University

Annual Exam - 2015

Intermediate of Science (I.Sc.), Part-II

Chemistry, Paper-II

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

Answer any *Five* Questions. Question No.1 is compulsory. Attempt Two Questions from Group 'A' and Two Questions from Group 'B'. All questions carry equal marks.

1. Choose the correct answer in the following :-

(a) The volume of a given mass at constant temperature is inversely proportional to its pressure is statement of :
(a) Boyle's law (b) Charles law
(c) Avogadro's law (d) None of these

(b) The apparatus used for electrolysis is called :
(a) Voltmeter (b) Electrochemical
(c) Coulometer (d) All of above

(c) The hybridization of carbon in carboxyl group is :
(a) sp (b) sp^2 (c) sp^3 (d) dps^2

(d) How many isomeric ether are presented by molecular formula $C_4H_{10}O$:
(a) 3 (b) 4 (c) 2 (d) 5

(e) Adsorption is a :
(a) bulk phenomenon (b) dissusion
(c) osomosis (d) surface phenomenon

(f) When sodium ethanoate is heated with sodium lime. The main product is :
(a) methane
(b) ethane
(c) mixture of methane and ethane
(d) none of these

(g) The amount of Electricity which librates 108 gm of silver nitrate solution is :
(a) 1 Faraday (b) 1 Amper (c) Coloumb (d) None of these

(h) CH_3OCH_3 and C_2H_5OH both have same molecular formula but differ in chemical properties. Such isomerism is known by :
(a) Position isomerism (b) Functional isomerism
(c) Chain isomerism (d) Metamerism

Group - A

2. Define and explain Dalton's law of partial pressure of a gas. Establish the relation between partial pressure of gas and total pressure in a mixture.
3. State and explain Hess's law of constant heat summation. What are its application?

See Back Page

4. State and explain first law of thermodynamics. Give its mathematical form.

5. Stat and explain the law of mass action and deduce expression for equilibrium constant for reaction :

$$nA + mB \Leftrightarrow xC + yD$$

Establish the relationship between Kp and Kc.

6. Write notes on the following :-
   (a) Buffer solution (b) pH of a solution
   (c) Kinetic theory of gases

Group - B

7. How is formic acid prepared in the laboratory. How does it differ from acetic acid.

8. Distinguish between the following :-
   (a) Aromatic and aliphatic compound
   (b) Primary and Secondary alcohol

9. How is 1st member of alkene prepared? Give the reaction with :-
   (a) Ozone
   (b) Hypobromous acid
   (c) Alkeline $KMNO_4$ solution

10. Write short notes on any *Two* of the following :-
    (a) Aldol condensation
    (b) Huckel rule
    (c) Polyster

✦ ✦ ✦

Programme of I.Sc. Part-II Counselling and Exam' 2015

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

(A) Practical Counselling

Date	*Time*	
	11.15 AM to 2.15 PM	**2.30 PM to 5.30 PM**
18.02.2015	Zoology (All Students)	Chemistry (All Students)
19.02.2015	Physics (All Students)	—

(B) Practical Examination

Date	*Time*	
	11.15 AM to 2.15 PM	**2.30 PM to 5.30 PM**
19.02.2015	—	Zoology (All Students)
20.02.2015	Physics (All Students)	Chemistry (All Students)

Nalanda Open University

Annual Exam - 2015

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 part of the questions carries 1 mark.

(i) When light is refracted, which of the following does not change?
(a) wavelength (b) frequency (c) velocity (d) Amplitude

(ii) The wavefronts of light coming from a distant source of unknown shape are nearly :
(a) plane (b) elliptical (c) cylindrical (d) spherical

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

(iv) A symmetric double convex lens is cut, into two equal parts by a plane containing the principal axis. If the power of the original lens was 4D, the power of a divided lens will be :
(a) 2D (b) 3D (c) 4D (d) 5D

(v) The focal length of a normal eye-lens is about :
(a) 1 mm (b) 2 cm (c) 25 cm (d) 1 m

(vi) A man is looking at a small object placed at his near point. Without altering the position of his eye or the object, he puts a simple microscope of magnifying power 5x before his eyes. The angular magnification achieved is :
(a) 5 (b) 2.5 (c) 1 (d) 0.2

(vii) Light from a point source falls on a screen. If the separation between the source and the screen is increased by 1%, the illuminance will decrease nearly by :
(a) 0.5% (b) 1% (c) 2% (d) 4%

(viii) A capacitor of capacitance C is charged to a potential V. The flux of the electric field through a closed surface enclosing the capacitor is :
(a) $\frac{CV}{\epsilon_0}$ (b) $\frac{2CV}{\epsilon_0}$ (c) $\frac{CV}{2\epsilon_0}$ (d) Zero

(ix) A uniform wire of resistance 50Ω is cut into 5 equal parts. These parts are now connected in parallel. The equivalent resistance of the combination is :
(a) 2Ω (b) 10 Ω (c) 250 Ω (d) 6250 Ω

(x) 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) upwards (d) downwards

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

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

See Back Page

(xiii) Two wires of the same length are shaped into square and a circle respectively and they carry the same current. Then, the ratio of their magnetic moments is :
(a) $2 : \pi$ (b) $\pi : 2$ (c) $4 : \pi$ (d) $\pi : 4$

(xiv) An LCR series circuit is connected to an alternating current source. At resonance the phase difference between the applied voltage and the current flowing through the circuit is :
(a) π (b) $\pi/2$ (c) $\pi/4$ (d) zero

(xv) The de-Broglie wave corresponding to a particle of mass m and velocity v has a wavelength associated with it :
(a) $\frac{h}{mv}$ (b) hmv (c) $\frac{mh}{v}$ (d) $\frac{m}{hv}$

(xvi) In Bohr's model of hydrogen atom, the lowest orbit corresponds to :
(a) infinite energy (b) maximum energy
(c) minimum energy (d) zero energy

2. On the basis of refraction at spherical surfaces, derive the lens makers' formula.
3. Derive Snell's law of refraction on the basis of wave theory of light.
4. Discuss deviation without dispersion and dispersion without deviation produced by a combination of prisms.
5. State and explain Gauss' law. Hence, find the electric field near an infinite plane sheet of charge having uniform surface charge density.
6. State and explain Faraday's law of electromagnetic induction. Obtain the value of induced e.m.f in a coil rotating in a uniform magnetic field.
7. Describe the construction and action of a moving coil galvanometer. Explain how it can be converter into an ammeter.
8. State and explain Kirchoff's laws. Discuss its application in wheatstone bridge.
9. What is Bohr's model of atoms? Discuss this model to explain the series spectra of Hydrogen atom.
10. What is a *p-n* junction diode? Define its dynamic resistance. Explain the function of a *p-n* junction diode as a rectifier.

✦ ✦ ✦

Programme of I.Sc. Part-II Counselling and Exam' 2015

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

(A) Practical Counselling

Date	*Time*	
	11.15 AM to 2.15 PM	**2.30 PM to 5.30 PM**
18.02.2015	Zoology (All Students)	Chemistry (All Students)
19.02.2015	Physics (All Students)	—

(B) Practical Examination

Date	*Time*	
	11.15 AM to 2.15 PM	**2.30 PM to 5.30 PM**
19.02.2015	—	Zoology (All Students)
20.02.2015	Physics (All Students)	Chemistry (All Students)