

**Nalanda Open University**  
**Annual Exam-2012, I.Sc. Part-I.**  
**Paper-I (Botany)**

Time: 3.00 Hrs.

Full Marks: 80

Answer any Five Questions. Questions No.-1 is compulsory. All questions are of equal value. Give sketches where necessary.

1. Select the correct answer in following statements.
  - (i) The field of Botany concerned with the study of living activities and functions is:  
(a) Ecology      (b) Physiology      (c) Cytology      (d) Genetics
  - (ii) Binomial nomenclature means writing the name of plants in two words which designate  
(a) Order and family      (b) Family and genus  
(c) Genus and species      (d) Species and variety
  - (iii) The study of plants and environmental relationship is:  
(a) Phytogeography      (b) Paleontology      (c) Ecology      (d) Plant Morphology
  - (iv) Plants which do not bear flower and seeds are:  
(a) Cryptogams      (b) Thallophyta      (c) Phanerogams      (d) Gymnosperms
  - (v) The binomial nomenclature was proposed by  
(a) Darwin      (b) Carolus Linnaeus      (c) Hugo de Vries      (d) Mendel
  - (vi) The basis of classification of living organism into prokaryotes and eukaryotes is  
(a) Nucleus      (b) Nucleolus      (c) Ribosomes      (d) Proteins
  - (vii) Food is changed to energy in  
(a) Chloroplast      (b) Mitochondria      (c) Nucleolus      (d) Nucleus
  - (viii) If all the ribosomes of a cell are destroyed  
(a) Photosynthesis will not occur      (b) Proteins will not be formed  
(c) Fats will not be stored      (d) Respiration will not take place
  - (ix) As per template theory amino acids first combine with  
(a) DNA      (b) t RNA      (c) s RNA      (d) m RNA
  - (x) Genes are made of  
(a) Hydrocarbons      (b) Lipoproteins      (c) Polynucleotide      (d) Histone
  - (xi) The basic difference in the division of plant cell and animal cell is  
(a) Cell plate formation      (b) Spindle formation  
(c) Coiling of chromosome      (d) Movement of chromosomes from equational plate
  - (xii) Viruses are entirely  
(a) Saprophytic      (b) Epiphytic      (c) Parasitic      (d) Symbiotic
  - (xiii) Which one of the following statement is correct  
(a) Some viruses contain DNA and some RNA      (b) All viruses contain DNA  
(c) All viruses contain RNA      (d) Viruses do not contain nucleic acid
  - (xiv) Number of stamens in Brassicaceae is  
(a) 6      (b) 10      (c) 5      (d)  $\infty$
  - (xv) To which family does *Lycopersicum esculentum* belong?  
(a) Fabaceae      (b) Asteraceae      (c) Poaceae      (d) Solanaceae
  - (xvi) In which of the following plant the leaf is modified to pitcher?  
(a) *Drosera*      (b) *Nepenthes*      (c) *Utricularia*      (d) *Dionaea*
2. Describe the floral characters of the family Fabaceae. Give the floral formula, floral diagram and botanical name of two plants of economic importance of this family.
3. Describe the structure of bacteriophage.
4. Write notes on any two of the following:
  - (a) Economic importance of Cyanobacteria      (b) Mycoplasma
  - (c) Transduction      (d) Protista
5. Describe the structure and function of nucleus.
6. Give an account of secondary growth in dicot stem.
7. Describe the Calvin cycle.
8. Mention the prophase I of meiosis.

**OR**

Write notes on any two of the following:

- (a) Transcription      (b) Mutation and its role in evolution      (c) Pulses
9. Describe the sources of air pollution and its control.
10. Give an account of grassland ecosystem.



**Nalanda Open University**  
**Annual Examination-2012**  
**Intermediate in Science, 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 from Group B. All questions are of equal marks.**

1. Select the correct answer from the following questions:
- (i) Elements having same mass number but different atomic number are called:  
(a) Isotopes                      (b) Isobars                      (c) Isotone                      (d) None of these
- (ii) Which of the following statement is correct?  
(a) Electron always behave as wave                      (b) S-orbital is non directional  
(c) An orbital can accommodate two electron with parallel spin  
(d) The energy of orbital is  $s > p > d > f$ .
- (iii) In which of the following Hund's rule is violated.  
(a)  $\uparrow$   $\uparrow\uparrow\uparrow$                       (b)  $\uparrow$   $\uparrow\uparrow\uparrow\uparrow$   
(c)  $\uparrow\downarrow$   $\uparrow\uparrow\uparrow$                       (d)  $\uparrow\downarrow$   $\uparrow\downarrow\uparrow\uparrow$
- (iv) If one s and 2p orbitals are hybridised together, it is called  
(a)  $sp^2$  hybridisation                      (b) sp hybridisation  
(c)  $sp^3$  hybridisation                      (d) none of these hybridisation
- (v) The specific reaction rate of a reaction depends upon the  
(a) concentration of the reactant                      (b) concentration of product  
(c) time                      (d) temprature
- (vi) Enzymes are :  
(a) micro organism                      (b) proteins                      (c) transition metal                      (d) fats.
- (vii) Finely devided metal catalyst is more effective becaues :  
(a) more energy is stored in the catalyst                      (b) collidal state is formed  
(c) more active centres are formed                      (d) surface area decreases
- (viii) When a radio active substance is subjected to a vacuum, the rate of disintegration.  
(a) increases                      (b) decreases                      (c) is not effected                      (d) reduces to zero

**Group-A**

2. What is meant by hybridisation? Write down the shapes of  $sp$ ,  $sp^2$  &  $sp^3$  hybridisation. Arrange these in order of decreasing bond angle in their molecule.
3. Define spectrum, Emission spectrum and Absorption spectrum. Discuss hydrogen spectrum in brief.
4. Distinguish between order of reaction and molecularity of reaction. Derive an expression of rate constant of first order reaction.
5. What do you understand by conjugate acid and base pair. Also discuss Lewis concept of Acid & Base.

**Or**

Write notes on:

- (a) carbon dating                      (b) nuclear fusion                      (c) Hund's rule

**Group-B**

6. Explain the following terms with reference to the periodic table.  
(a) Diagonal relationship (b) Typical element (c) Representative Elements (d) Transition metals
7. Define and exemplify the terms.  
(a) Gangue                      (b) Flux                      (c) Slag  
(d) Smelting                      (e) Roasting                      (f) Concentration of ores.
8. Describe the preparation and properties of any two of following:  
(a) Sodium thiosulphate                      (b) Potash alum                      (c) Calcium ammonium nitrate.
9. How can you explain water pollution? Describe its nature. What is its effect on public health.
10. Describe the principle and the method of preparation of washing soda on large scale by using Solvay (Ammonia-Soda) process.

**Nalanda Open University**  
**Annual Exam-2012,**  
**Intermediate of Science, Part-I**  
**Mathematics, Paper-I**

**Time: 3.00 Hrs.**

**Full Marks: 80**

**Answer any Five Questions while Question number 1 is Compulsory. All questions are of equal value.**

1. Select the correct answer out of 4 alternative answers prescribed. Each part of the question carries 1 mark.
- (a) Let  $A \subset B$  then  
 (i)  $A \cup B = A$                       (ii)  $A - B = \phi$                       (iii)  $A \cap B = B$                       (iv)  $A' \subset B'$
- (b) Let  $f(x) = \frac{x-2}{x-3}$ , then  $f$  is  
 (i) one - one                      (ii) onto                      (iii) one-one onto                      (iv) none of these
- (c) If  $|Z|=1$ , then  $\frac{1+Z}{1+\bar{Z}}$  equals  
 (i)  $\bar{Z}$                       (ii)  $\frac{1}{\bar{Z}}$                       (iii)  $\frac{1}{Z}$                       (iv)  $\frac{1}{1+Z}$
- (d) If the roots of the equation  $x^3 - 12x^2 + 39x - 28 = 0$ , are in A.P, then its common difference is  
 (i)  $\pm 1$                       (ii)  $\pm 2$                       (iii)  $\pm 3$                       (iv)  $\pm 4$
- (e) The values of  $k$  so that the quadratic equation  $x^2 - 2(k-1)x + k + 5 = 0$  has at least one positive root is  
 (i)  $k \geq 0$                       (ii)  $k \leq 0$                       (iii)  $k \leq -1$                       (iv)  $k \geq 1$ .
- (f) If  $(1+x)^n = C_0 + C_1x + C_2x^2 + \dots + C_nx^n$ , then  $C_0C_r + C_1C_{r+1} + C_2C_{r+2} + \dots + C_{n-r}C_n$  equals to  
 (i)  $C^2r$                       (ii)  $2^r$                       (iii)  $2^{n-r}$                       (iv)  $\frac{2n}{n-r} \frac{1}{n+r}$
- (g) The inverse of  $\begin{bmatrix} 2 & -3 \\ -4 & 2 \end{bmatrix}$  is  
 (i)  $-\frac{1}{8} \begin{bmatrix} 2 & 3 \\ 4 & 2 \end{bmatrix}$                       (ii)  $-\frac{1}{8} \begin{bmatrix} 3 & 2 \\ 2 & 4 \end{bmatrix}$                       (iii)  $\frac{1}{8} \begin{bmatrix} 2 & 3 \\ 4 & 2 \end{bmatrix}$                       (iv)  $\frac{1}{8} \begin{bmatrix} 3 & 2 \\ 2 & 4 \end{bmatrix}$
- (h) If  $\begin{vmatrix} 6i & -3i & 1 \\ 4 & 3i & -1 \\ 20 & 3 & i \end{vmatrix} = x + iy$  then  
 (i)  $x = 3, y = 1$                       (ii)  $x = 1, y = 3$                       (iii)  $x = 0, y = 3$                       (iv)  $x = 0, y = 0$ .
- (i) For  $x \in R$ , the range of  $f(x) = \frac{x}{1+x^2}$  is  
 (i)  $\left[-\frac{1}{2}, \frac{1}{2}\right]$                       (ii)  $[0, 1]$                       (iii)  $[-1, 1]$                       (iv)  $[-1, 0]$
- (j) The general solution of the equation  $\cos \theta = \cos \alpha$  (where  $\alpha$  is a constant angle), is  
 (i)  $\theta = n\pi + \alpha$                       (ii)  $\theta = 2n\pi + \alpha$                       (iii)  $\theta = 2n\pi - \alpha$                       (iv)  $\theta = 2n\pi + \alpha$ ,  $n$  is an integer.

(k) The value of  $\tan \frac{\pi}{8}$  equals

- (i)  $\sqrt{2} + 1$       (ii)  $\sqrt{2} - 1$       (iii)  $\sqrt{3} + 1$       (iv)  $\sqrt{3} - 1$

(l) The general equation of a line in two dimensional space is

- (i)  $y = mx + c$       (ii)  $ax + by + c = 0$       (iii)  $\frac{x}{a} + \frac{y}{b} = 1$       (iv)  $x \cos \alpha + y \sin \alpha = p$

(m) The length of the tangent line drawn from an external point  $(x_1, y_1)$  to the circle  $x^2 + y^2 + 2gx + 2fy + c$

- (i)  $(gx_1 + fy_1 + c)^{\frac{1}{2}}$       (ii)  $\sqrt{x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c}$   
(iii)  $x x_1 + y y_1 + g(x + x_1) + f(y + y_1) + c$       (iv)  $\{(x_1 + g)^2 + (y_1 + f)^2\}^{\frac{1}{2}}$

(n) The vertex of the parabola  $x^2 + 4x - 2y + 6 = 0$  lies at

- (i)  $(2, 1)$       (ii)  $(Z, -1)$       (iii)  $(-2, 1)$       (iv)  $(-2, -1)$

(o) The condition for the tangency of the line  $y = m x + c$  to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  is

- (i)  $c = \sqrt{a^2 m^2 - b^2}$       (ii)  $c = \sqrt{a^2 m^2 + b^2}$   
(iii)  $c = \sqrt{m^2 b^2 - a^2}$       (iv)  $c = \sqrt{b^2 m^2 + a^2}$

(p) The equation of directrices to the hyperbola  $x^2 - y^2 = C^2$  are

- (i)  $x = \pm c \sqrt{2}$       (ii)  $y = \pm c \sqrt{2}$       (iii)  $x = \pm \frac{C}{\sqrt{2}}$       (iv)  $y = \pm \frac{C}{\sqrt{2}}$

2. (i) Let X be a finite set. Then, prove that its power set is also a finite set.

(ii) Let  $X = \{1, 2\}$ ,  $Y = \{1, 3, 4\}$ ,  $Z = \{4, 5, 6\}$ , then find  $X \times (Y - Z)$ .

3. (i) Define a Boolean Algebra and give an example of it with full logic.

4. (i) Express  $\frac{1+i}{2-i}$  in the polar form.

(ii) Find all values of  $(1+i)^{\frac{1}{5}}$

5. (i) Insert n geometric means between two distinct positive real numbers.

(ii) Evaluate the sum of the cubes of first n natural numbers.

6. (i) Prove that irrational roots of a quadratic equation with rational Coefficients always occur in Conjugate pair i.e. if  $\alpha + \sqrt{\beta}$  be one root of the equation  $ax^2 + bx + c = 0$ , where a, b, c are rationals, then the other root will be  $\alpha - \sqrt{\beta}$ .

(ii) If the ratio of the roots of the equation  $ax^2 + bx + c = 0$  is r, then prove that  $\frac{b}{ac} = \frac{r+1}{r}$ .

7. (i) In how many ways can be letters of word "VALEDICTORY" be arranged so that the Vowels may never be separated?

(ii) Use mathematical induction to prove the inequality  $(1+x)^n > 1+nx$ , for  $n=2,3,4,\dots$  and  $x > -1, x \neq 0$ .

8. (i) Find the greatest term in the expansion of  $(7-5x)^{11}$ , where  $x = \frac{2}{3}$ .

(ii) Find the sum of the infinite series.

$$\frac{2}{\sqrt{1}} + \frac{4}{\sqrt{3}} + \frac{6}{\sqrt{5}} + \dots \text{to } \alpha.$$

9. (i) Prove that  $\cos A + \cos B + \cos C = 1 + 4 \sin \frac{A}{2} \sin \frac{B}{2} \sin \frac{C}{2}$ , when  $A + B + C = \pi$ .

(ii) If in a  $\Delta ABC$ ,  $A = 2B$ , show that  $B = C$  or  $a^2 = b(b + c)$ .

10. (i) Find the locus of a variable point which moves so that the sum of its distances from two given points  $(k, 0)$  and  $(-k, 0)$  is  $2a$ .

(ii) Find the equation of the circle through points  $(2,3)$ ,  $(-1,6)$  and having Centre on the line  $2x + 5y + 1 = 0$ .

**Nalanda Open University**  
**Annual Exam-2012, I.Sc. Part-I.**  
**Paper-I (Physics)**

Time: 3.00 Hrs.

Full Marks: 80

Answer any **Five** Questions, in which Question No.-1 is compulsory.

Each questions are of equal value.

1. Select the correct option in each of the following. Each part of the question carries 1 marks.
- (i) There are two bodies on the top of a tower. One is dropped, while the other is projected horizontally, simultaneously. Which one will reach the ground earlier?  
(a) Horizontally projected body (b) Vertically dropped body  
(c) Both reach the ground at the same time (d) Cannot be predicted
- (ii) Moment of inertia of a hollow Sphere about its diameter is  
(a)  $MR^2$  (b)  $\frac{1}{2}MR^2$  (c)  $\frac{2}{3}MR^2$  (d)  $\frac{2}{5}MR^2$
- (iii) If the magnitudes of the sum and difference of two vectors are same then the angle between them is  
(a)  $0^\circ$  (b)  $45^\circ$  (c)  $90^\circ$  (d)  $180^\circ$
- (iv) Two masses of 1Kg and 4Kg are moving with equal Kinetic energies. The ratio of the magnitudes of their linear momenta is  
(a)  $\sqrt{2}:1$  (b)  $1:2$  (c)  $4:1$  (d)  $1:16$
- (v) The angular speed of the 'second' needle of a watch is  
(a)  $\frac{\pi}{6}$  radian/hr (b)  $\frac{\pi}{60}$  radina/s (c)  $\frac{\pi}{1800}$  radian/s (d)  $2\pi$  radian/min
- (vi) Which of the following interactions is responsible for the emission of  $\beta$  particles from radioactive nuclii.  
(a) Gravitational (b) Electromagnetic (c) Nuclear (d) Weak.
- (vii) If the radii of circular paths of two particles of same masses are in the ratio 1:2 then in order in the ratio  
(a)  $1:4$  (b)  $4:1$  (c)  $1:\sqrt{2}$  (d)  $\sqrt{2}:1$
- (viii) The potential energy of a satellite of mass  $m$  revolving at a height  $R_e$  above the surface of earth ( $R_e =$  radius of earth) is :  
(a)  $mgR_e$  (b)  $-mgR_e$  (c)  $-\frac{mgR_e}{2}$  (d)  $-\frac{mgR_e}{4}$
- (ix) A simple pendulum has a time period  $T_1$  when on the earth's surface and  $T_2$  when taken to a height  $R_e$  (Earth's radius) above the earth's surface then  $T_2 : T_1$  is  
(a) 1 (b)  $\sqrt{2}$  (c) 4 (d) 2
- (x) Two equal drops are falling through air with a steady velocity of 5cm/sec. If the drops Coalesce; the new terminal velocity will be  
(a)  $5 \times 2$  cm/sec (b)  $5 \times \sqrt{2}$  cm/sec (c)  $5 \times (4)^{1/3}$  cm/sec (d)  $\frac{5}{\sqrt{2}}$  cm/sec.
- (xi) The boiling point of pure water at standard pressure is given by  
(a) 173.15 K (b) 273.15 K (c) 373.15 K (d) 473.15 K
- (xii) The modulus of elasticity of a material does not depend upon  
(a) nature of material (b) Shape (c) impurities mixed (d) temperature
- (xiii) If  $C_p$  and  $C_v$  are the specific heats of a gas then the ratio  $C_p/C_v$  is  
(a) greater than 1 (b) less than 1 (c) equal to 1 (d) the same for all gases
- (xiv) Which of the following statements about thermal radiation is not true.  
(a) these are electromagnetic waves  
(b) it increases vibrational or rotational energy of atoms or molecules when absorbed  
(c) it travels with the speed of sound  
(d) it can travel through vacuum.
- (xv) The fundamental frequency of transverse vibration of a stretched string is given by  
(a)  $\lambda = \frac{1}{2l} \sqrt{\frac{F}{\mu}}$  (b)  $\lambda = 2l \sqrt{\frac{F}{\mu}}$  (c)  $\lambda = \frac{1}{2l} \sqrt{\frac{\mu}{F}}$  (d)  $\lambda = 2l \sqrt{\frac{\mu}{F}}$

(xvi) Two tuning forks of frequency 250 HZ and 256 HZ produce beats. If a maximum is observed just now, then after how much time, the minimum is observed at the same place.

- (a)  $\frac{1}{18}$  sec.      (b)  $\frac{1}{24}$  sec.      (c)  $\frac{1}{6}$  sec.      (d)  $\frac{1}{12}$  sec.

2. What are the three important uses of dimensional equations. Illustrate them with suitable examples. What are the limitations of dimensional method.
3. If two point masses  $m_1$  &  $m_2$  moving in a straight line along the same direction with velocities  $u_1$  and  $u_2$  respectively, collide elastically, then find their velocities after collision.
4. State and explain the laws of static friction and kinetic friction.  
A block whose mass is 40 Kg is pulled with a uniform speed on a horizontal surface. If a force acts at an angle  $60^\circ$  with the horizontal and the coefficient of friction is  $\frac{1}{32}$  then calculate the magnitude of the force.
5. Derive the expressions for (a) Kinetic energy and (b) the angular momentum of a rotating rigid body in terms of its moment of inertia about the axis of rotation.
6. Find the gravitational field intensity due to a uniform solid sphere at a point (a) outside and (b) inside the sphere.
7. Define coefficient of viscosity. Derive Poiseuille's equation and use it to find  $\eta$  of a liquid (Give experimental details).
8. What are the postulates of kinetic theory of gases? Use them to find expression for pressure of an ideal gas.
9. What is Doppler effect? Derive expression for change in frequency for the cases (i) when observer is at rest and source in motion and (ii) when source is moving away from the observer.
10. Write notes on any two of the following :
  - (a) Projectile motion
  - (b) Conservative and non Conservative forces
  - (c) 1st law of thermodynamics
  - (d) Laplace's correction for velocity of sound in air.



**Nalanda Open University**  
**Annual Exam-2012,**  
**Intermediate of Science, Part-II**  
**Mathematics, Paper-II**

**Time: 3.00 Hrs.**

**Full Marks: 80**

**Answer any Five Questions while Question number 1 is Compulsory. All questions are of equal value.**

1. Select the correct answer out of 4 alternative answers prescribed. Each part of the question carries 1 mark.

(a) The value of  $\lim_{x \rightarrow 0} \frac{a^x - b^x}{x}$  equals

- (i)  $a - b$                       (ii)  $\log a - \log b$                       (iii)  $e^a - e^b$                       (iv) 0

(b) If  $ax^2 + 2hxy + by^2 = 1$ , then the value of  $\frac{dy}{dx}$  equals

- (i)  $\frac{ax}{hy}$                       (ii)  $\frac{ax+hy}{hx+by}$                       (iii)  $\frac{ax+hy}{hxy}$                       (iv)  $-\frac{ax+hy}{hx+by}$

(c) If  $x = a(t + \sin t)$  &  $y = a(1 - \cos t)$ , then  $\frac{dy}{dx}$  at  $t = \frac{\pi}{2}$  equals

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

(d) The nature of the function  $f(x) = 2x^3 - 15x^2$  in the interval (0,5) is

- (i) increasing                      (ii) decreasing                      (iii) constant                      (iv) neither increasing nor decreasing.

(e) The value of the integral  $\int a^x dx$  equals

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

(f) The  $\int_0^{\pi/2} \frac{\sqrt{\sin x} dx}{\sqrt{\cos x} + \sqrt{\sin x}}$  equals

- (i)  $\frac{\pi}{4}$                       (ii)  $\frac{\pi}{2}$                       (iii)  $\pi$                       (iv)  $\frac{3\pi}{4}$

(g) The differential equation  $y = px + \sqrt{a^2 p^2 + b^2}$  is of

- (i) 1st order and 1st degree                      (ii) 1st degree and second order

(iii) second order and second order                      (iv) none of these, where  $p = \frac{dy}{dx}$

(h) The equation of the curve having slope at a current point  $p(x, y)$ ,  $2x$  and passing through the point (1,4), is

- (i)  $y = x^2 + 3$                       (ii)  $x^2 = y + 3$                       (iii)  $xy = 3$                       (iv)  $\frac{1}{x} + \frac{1}{y} = 3$ .

(i) The position vectors of the points A, B, C, D are  $\vec{a}, \vec{b}, 2\vec{a} + 3\vec{b}$  and  $\vec{a} - 2\vec{b}$  respectively,

then  $\vec{DB}$  equals

- (i)  $\vec{a} - 3\vec{b}$                       (ii)  $\vec{a} - \vec{b}$                       (iii)  $3\vec{b} - \vec{a}$                       (iv)  $\vec{a} + \vec{b}$

(j) If two vectors (non-zero) have their scalar product zero, then the vectors are

- (i) parallel                      (ii) perpendicular                      (iii) coincident                      (iv) none of these





(ii) Text the dependence/independence of the vectors

$$\vec{a} = 2\hat{i} - 5\hat{j} + 3\hat{k}, \quad \vec{b} = 3\hat{i} - 4\hat{j} + 4\hat{k} \quad \text{and} \quad \vec{c} = \hat{i} + 3\hat{j} + 2\hat{k}.$$

10. (i) Find the vector equation of the plane passing through (1,2,-4) and parallel to the line

$$\vec{r} = \hat{i} + 2\hat{j} - 4\hat{k} + \lambda \left( 2\hat{i} + 3\hat{j} \right)$$

(ii) Three parallel forces P, Q, R act at the Vertices A, B, C of the  $\Delta ABC$  and the resultant passes through the centroid of the  $\Delta ABC$ . Prove that  $P = Q = R$ .

11. (i) A boatman can save 4 seconds in crossing a river by quickest path than by the shortest path.

If the river flows at 5ft/sec and that the boat 13ft/sec in still water. Find the width of the river.

(ii) From a point on the ground at a distance x from the foot of a vertical wall, a stone is thrown

at an angle  $\frac{\pi}{4}$  with the horizontal, which just clears the top of the wall and after wards

strikes the ground at a distance y on the other side of the wall. Show that the height of the

wall is  $\frac{xy}{x+y}$ .

**Nalanda Open University**  
**Annual Exam-2012, I.Sc. Part-II.**  
**Paper-II, Biology (Zoology)**

**Time: 3.00 Hrs.**

**Full Marks: 80**

Answer any ***Five*** Questions. Questions No.-1 is compulsory.

All questions are of equal value.

1. Select the correct answer in each of the following questions. Each part of the question carries one mark.
  - (i) Which stage is shortest duration of mitosis?  
(a) Anaphase (b) Metaphase (c) Telophase (d) Prophase
  - (ii) Which is not found in Mitochondria?  
(a) Ribosome (b) DNA (c) RNA (d) Protein
  - (iii) How many ATP are released during Krebs Cycle?  
(a) 12 ATP (b) 24 ATP (c) 38 ATP (d) 2 ATP
  - (iv) DNA is found in  
(a) Nucleus (b) Mitochondria (c) Ribosome (d) Centriole
  - (v) Amoeba's pseudopodia is meant for :  
(a) Respiration (b) Locomotion (c) Reproduction (d) Excretion
  - (vi) Frog heart is :  
(a) 2-chambered (b) 3-chambered (c) 4-chambered (d) Single chambered
  - (vii) Theory of Natural Selection was proposed by :  
(a) Lamarck (b) Darwin (c) Weismann (d) Wallace.
  - (viii) Which of the following is called tapeworm?  
(a) Ascaris (b) Ancylostoma (c) Taenia (d) Fasciola
  - (ix) Blood is which type of tissue?  
(a) Connective (b) Epithelial (c) Muscular (d) Nervous
  - (x) Which of the following diseases is caused by a virus?  
(a) Typhoid (b) Cholera (c) Polio (d) Tuberculosis
  - (xi) Glucose is stored as glycogen in which of the organs?  
(a) Spleen (b) Kidney (c) Liver (d) Intestine
  - (xii) Sertoli cells are found in :  
(a) Testes (b) Ovary (c) Stroma (d) Vas deferens
  - (xiii) Which of the following is the causative agent of Kalaazar?  
(a) Plasmodium (b) Trypanosoma (c) Salmonella (d) Leishmania donovani
  - (xiv) Which of the following endocrine glands secretes thyroxine?  
(a) Pituitary (b) Thyroid (c) Adrenal (d) Islets of Langerhans
  - (xv) Epiboly is a process of :  
(a) Blastulation (b) Gastrulation (c) Cleavage (d) Fertilization
  - (xvi) Cockroach is a:  
(a) Protozoa (b) Insecta (c) Mollusca (d) Porifera
2. Write short notes on any **two** of the following :-
  - (a) Struggle for existence (b) HIV
  - (c) Diabetes mellitus (d) Blood group
3. Describe the structure and classification of carbohydrates.
4. Write an essay on Darwinism.
5. Give an account of structure and function of thyroid gland.
6. Describe the respiratory system of Cockroach.
7. What is tissue? Classify the animal tissues.
8. Describe the digestive system of frog.
9. Describe the reproductive system of Earthworm.
10. Give an account of diseases caused by Bacteria and Viruses and their symptoms.

**Nalanda Open University**  
**Annual Examination-2012**  
**Intermediate in Science, 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 from Group B. All questions are of equal marks.**

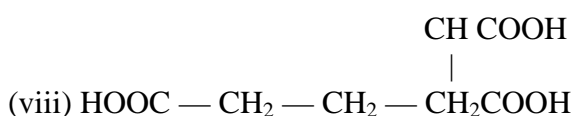
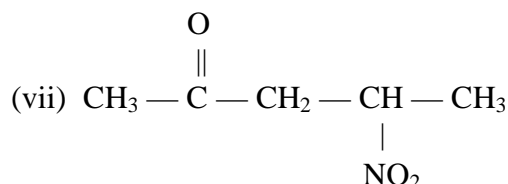
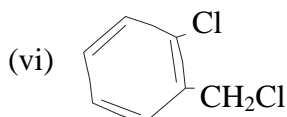
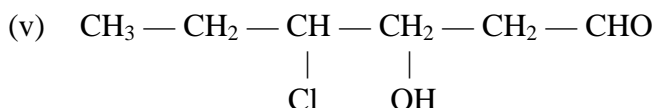
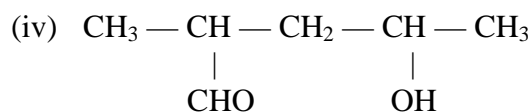
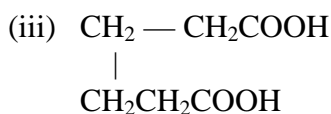
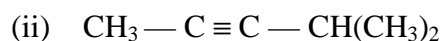
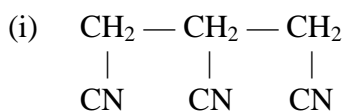
1. Select the correct answer from the following questions:
- (i) Which has hcp Crystal Structure?  
(a) NaCl (b) CsCl (c) Zn (d) RbCl
- (ii) The amount of electricity which Liberates 108 gm of silver from silver nitrate solution is  
(a) 1 Faraday (b) 1 Amper  
(c) 1 Coloumb (d) None of these
- (iii) The hybridisaton of Carbon in Carboxyl group is  
(a) sp (b) sp<sup>2</sup> (c) sp<sup>3</sup> (d) dsp<sup>2</sup>
- (iv) How many isomeric ether are represented by molecular formula C<sub>4</sub>H<sub>10</sub>O.  
(a) 3 (b) 2 (c) 4 (d) 5
- (v) When sodium ethanoate is heated with Soda-lime, the main product is.  
(a) Methane (b) Ethane  
(c) Mixture of methane and Ethane (d) none of these
- (vi) Adsorption is a  
(a) bulk phenomenon (b) surface phenomenon  
(c) diffusion (d) osomosis.
- (vii) If Water Vapour is passed over silica get then  
(a) silicic acid is formed (b) complex formation takes place  
(c) adsorption takes place (d) absorption takes place.
- (viii) In which of the following reaction, K<sub>p</sub> = K<sub>e</sub>  
(a)  $\text{PCl}_5 \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$   
(b)  $\text{CH}_3\text{COOH}(\text{l}) + \text{C}_2\text{H}_5\text{OH}(\text{l}) \rightleftharpoons \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}(\text{l})$   
(c)  $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$   
(d)  $\text{N}_2(\text{g}) + 2\text{O}_2(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$

**Group-A**

2. What are basic assumption of Kinetic Theory of gases? Derive the kinetic gas equation. Deduce mean or average kinetic energy from the equation.
3. State and explain first law of thermodyncs. Give its mathematical forms.
4. Derive Osward Dilution law with the help of Law of mass action. How does the degree of dissociation of an electrolyte increased on dilution of its solution.
5. What is electrode? How does potential develop in an electrode? Give an expression for electrode potential of an electrode having reaction:-  
$$\text{M}^{n+} + \text{ne} \rightleftharpoons \text{M}$$
6. Explain the following terms with reference to the periodic table.  
(a) Diagonal relationship (b) Typical elements (c) Representative Elements (d) Transition metals

**Group-B**

7. Give I.U.P.A.C name of the following:



8. Distinguish between the following.

- (i) Primary alcohol, Secondary alcohol & Tertiary alcohol
- (ii) Aromatic and aliphatic compound

9. Give two methods of preparation of Phenol write only principle with equations. How does phenol react with the following?

- (a) Acetyl chloride in presence of NaOH
- (b) Chloroform in presence of Aqueous NaOH
- (c)  $\text{CO}_2$  and NaOH at  $125^\circ \text{C}$ .

Or

How is 1st member of alkene prepared? Give its reaction with

- (a) Ozone
- (b) alkaline  $\text{KMnO}_4$  solution
- (c) Hypobromous acid.

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

- (a) Aldol condensation
- (b) Huckel rule
- (c) Inductive effect.

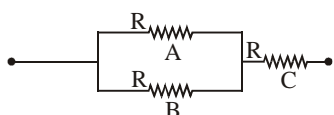
\* \* \* \* \*

Answer any **Five** Questions, in which Question No.-1 is compulsory.

Each questions are of equal value.

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

- (i) A short linear object is placed along optic axis of a concave mirror between focus and centre of curvature then.
- (a) a real elongated image will be formed  
 (b) an elongated virtual image will be formed  
 (c) an inverted, enlarged image will be formed  
 (d) a diminished virtual image will be formed
- (ii) Two equi convex lens of glass ( $\mu = \frac{3}{2}$ ), each of focal length 20 cm are placed in contact and the space between them is filled with water ( $\mu = \frac{4}{3}$ ), then the focal length of the equivalent lens is
- (a) 15cm      (b) 50cm      (c) 40cm      (d) 10cm
- (iii) Total internal reflection may occur when a ray travels from
- (a) vacuum to glass      (b) vacuum to air  
 (c) water to glass      (d) glass to air
- (iv) The phenomenon of photo electric effect demonstrates the fact that
- (a) light is an electromagnetic      (b) light posses transverse wave nature  
 (c) light possess longitudinal wave nature      (d) light posses particle nature.
- (v) Farad is the SI unit of
- (a) current      (b) charge      (c) capacitance      (d) resistance
- (vi) A capacitor of Capacity C is connected parallel to two similar capacitors (connected in series) then the equivalent capacity of the combination is
- (a)  $\frac{C}{2}$       (b)  $\frac{3C}{2}$       (c) 3C      (d)  $\frac{C}{3}$ .
- (vii) A piece of copper wire has a resistance R. Is stretched so as to double its length. Then the new resistance of wire will be
- (a) R      (b) 2R      (c) 4R      (d)  $\frac{R}{4}$
- (viii) Three equal resistors are connected as shown in the figure:



The maximum power consumed by each resistor is 18 w. The maximum power consumed by the

- (a) 18      (b) 27      (c) 36      (d) 54
- (ix) An electric bulb rated for 500 wats at 100 volts is used in a circuit having a 200 volt supply. The resistance R that must be put in series with the bulb, so that the bulb draws 500 wats is
- (a)  $10\ \Omega$       (b)  $20\ \Omega$       (c)  $50\ \Omega$       (d)  $100\ \Omega$
- (x) Tangent galvanometer is most sensitive when deflection of the needle is
- (a)  $0^\circ$       (b)  $30^\circ$       (c)  $45^\circ$       (d)  $90^\circ$
- (xi) In an A.C. circuit, the current is  $I = 5 \sin\left(100t - \frac{\pi}{2}\right)$  amp. and the A.C. potential is  $V = 200 \sin(100t)$  volt. Then the power consumption is
- (a) 20 watts      (b) 10 watts      (c) 1000 watts      (d) 0.
- (xii) 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)  $\frac{m}{hv}$
- (xiii) In the Bohr's model of hydrogen atom, the lowest orbit corresponds to
- (a) infinite energy      (b) maximum energy  
 (c) minimum energy      (d) zero energy

(xiv) An excited hydrogen atom emits a photon of wavelength  $\lambda$  in returning to the ground state. The quantum number  $n$  of the excited state is given by ( $R$ = Rydberg Constant)

(a)  $\sqrt{\lambda R(\lambda R - 1)}$

(b)  $\sqrt{\lambda R / (\lambda R - 1)}$

(c)  $\sqrt{(\lambda R - 1) / \lambda R}$

(d)  $1 / \sqrt{\lambda R(\lambda R - 1)}$

(xv) The probability of a radioactive atom to survive 5 times longer than its half life period is

(a)  $\frac{2}{5}$

(b)  $\left(\frac{1}{2}\right)^5$

(c)  $\frac{1}{5}$

(d) None of these

(xvi) How many NAND gates are used to obtain an AND gate?

(a) 1

(b) 2

(c) 3

(d) 4.

2. Determine the focal length of a combination of two coaxial lenses of focal  $f_1$  and  $f_2$  separated by distance.
3. Discuss deviation without dispersion in a prism. What is dispersion without deviation?
4. State and explain Huygen's principle. Use it to derive the laws of reflection of plane wave front at a plane surface.
5. State and explain Gauss' law. Use this law to find the electric field in the vicinity of an infinite plane sheet of charge having uniform surface charge density.
6. State and explain Kirchoff's laws. Discuss its application in wheatstone bridge.
7. Find expressions for equivalent resistance when two or more resistance are grouped (i) in series & (ii) in parallel.  
Also, distinguish between e.m.f. and terminal potential difference of a source.
8. Find the expression for the induced e.m.f. in a coil rotating in a uniform magnetic field.  
Distinguish between r.m.s and peak value of current.
9. Describe Thomson's experiment for determination of  $e/m$  of electron.  
What is De Broglie's relation?
10. Describe the logic gates : AND, OR, NOT, NAND & NOR. Give truth tables for each of these gates.



Nalanda Open University  
Annual Exam-2012  
Intermediate of Arts, Science and Commerce, Part-I,  
Hindi Composition (हिन्दी राष्ट्रभाषा)

Time: 3Hrs

Full Marks: 100

**खंड-1** और **खंड-2** से दो-दो तथा **खंड-3** से एक प्रश्न का उत्तर दीजिये ।  
सभी प्रश्नों के अंक समान हैं ।

**खंड-1**

1. विद्यापति की कविताओं का भाव स्पष्ट कीजिए ।
2. कबीर की कविताओं की मूल चेतना क्या है?
3. जयशंकर प्रसाद का कवि परिचय दीजिए ।
4. 'कालिदास सच-सच बतलाना' कविता का भावार्थ स्पष्ट कीजिए ।

**खंड-2**

5. 'उसने कहा था' कहानी का सारांश लिखिए ।
6. 'अशोक के फूल' निबंध के आधार पर आचार्य द्विवेदी के ललित निबंधों की विशेषताएँ बताइए ।
7. पठित संस्मरण के आधार पर निराला की विशेषताएँ बताइए ।
8. 'तीसरी कसम' कहानी के हिरामन का चरित्र चित्रण कीजिए ।

**खंड-3**

9. भाषा के सामाजिक संदर्भ की विवेचना कीजिए ।
10. जनसंचार माध्यमों का परिचय दीजिए ।

२०२०



Nalanda Open University  
Annual Exam-2012  
Intermediate of Arts, Science and Commerce, Part-I,  
Hindi Composition (हिन्दी राष्ट्रभाषा)  
अहिन्दी भाषियों के लिए

Time: 1½Hrs

Full Marks: 50

प्रत्येक खंड से प्रश्न चयन करते हुए कुल **पाँच** प्रश्नों के उत्तर लिखिए ।  
सभी प्रश्नों के अंक समान हैं ।

**खंड-क**

1. रहीम के नीतिगत दोहों में व्यक्त भावों का वर्णन कीजिए ।
2. 'भिक्षुक' कविता की विशेषता पर प्रकाश डालिए ।
3. 'स्वाधीन भारत की सेना' कविता राष्ट्रप्रेम की भावना पैदा करने वाली कविता है । स्पष्ट कीजिए ।
4. 'विश्व वेदना' कविता के कवि का परिचय दीजिए ।
5. व्याख्या कीजिए -
  1. कस्तूरी कुंडलि बसै, मृग ढूँढे बन माहिं ।  
ऐसे घट-घट राम हैं, दुनिया देखै नाहिं ॥
  2. माला फेरत युग भया, फिरा न मन का फेर ।  
कर का मनका डारि दे, मन का मनका फेर ॥
  3. हम प्रभात की नयी किरण हैं, हम दिन के आलोक नवल,  
हम नवीन भारत के सैनिक, धीर,वीर, गंभीर अचल ।

**खंड-ख**

6. द्विवेदीजी ने लक्ष्मण एवं उर्मिला में से किसके त्याग को बड़ा माना है और क्यों? स्पष्ट कीजिए ।
7. 'पूस की रात' कहानी की मुख्य समस्या क्या है? प्रकाश डालिए ।
8. 'बिंदा मेरी बाल सखी' का सारांश लिखिए ।
9. 'ल्हासा की यात्रा' का प्रतिपाद्य लिखिए ।
10. आलोच्य रिपोतार्ज में कौन सी तीन अन्तः कथाएँ हैं?

