

NALANDA OPEN UNIVERSITY

Annual Examination, 2013

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

PAPER-I (Physics)

Time : 3 Hours

Full Marks : 80

Answer any Five Questions, in which Question No. 1 is Compulsory. All Questions carry equal Marks.

1. Select the correct option in each of the following. Each part of the question carries 1 mark.
- (a) A Laser light beamed to the moon, from a place on the surface of earth, takes 2.56 sec. to return after reflecting from moon's surface. Then, the radius of the lunar orbit must be,
- (i) $1.92 \times 10^{10} \text{ cm}$ (ii) $3.84 \times 10^8 \text{ m}$
(iii) $7.68 \times 10^8 \text{ m}$ (iv) infinite
- (b) identify the pair of physical quantities having different dimensions,
- (i) Planck's constant and angular momentum (ii) Work and energy
(iii) Angular momentum and frequency (iv) Energy density and pressure
- (c) The limit of which of the following, as $\theta \rightarrow 0$, is not equal to one,
- (i) $\sin \theta / \theta$ (ii) $\cos \theta / \theta$
(iii) $\sec \theta / \theta$ (iv) $\tan \theta / \theta$
- (d) Two projectiles are projected at angles 30° and 45° to the horizontal, the velocity of projection being v_0 and $2v_0$ respectively then, the maximum height reached will be in the ratio,
- (i) 1 : 1 (ii) 1 : 2
(iii) 1 : 4 (iv) 2 : 1
- (e) Moment of inertia of a ring of mass M and radius R about its diameter is,
- (i) $\frac{1}{4}MR^2$ (ii) $\frac{1}{2}MR^2$
(iii) MR^2 (iv) $\frac{3}{2}MR^2$
- (f) $(\hat{i} + \hat{j}) \times (\hat{j} - \hat{k})$ is,
- (i) $\hat{i} + \hat{j} + \hat{k}$ (ii) $-\hat{i} + \hat{j} + \hat{k}$
(iii) $\hat{i} - \hat{j} + \hat{k}$ (iv) $\hat{i} + \hat{j} - \hat{k}$
- (g) 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,
- (i) 80 radians/sec (ii) 40 radians/sec
(iii) 160 radians/sec (iv) 20 radians/sec
- (h) A marble ball is dropped from a height of 8 m above the hard ground whose coefficient of restitution, e, is $\frac{1}{\sqrt{2}}$. Then, the height to which the ball will rebound after 3 successive collisions with ground is,
- (i) 4 m (ii) $2\sqrt{2}$ m
(iii) 1 m (iv) 8 m
- (i) A hoop, a disc, a hollow and a solid sphere, all of same mass and radius take part in a race on an inclined plane. If all roll without slipping, starting from the top, then the race is won by,
- (i) The hoop (ii) The disc
(iii) The hollow sphere (iv) The sold sphere
- (j) A bomb explodes into two unequal fragments in the ratio 1 : 2 as a result of which an energy of 10^{10} J is released in the form of the kinetic energy of the fragments. The kinetic energy of the biggest fragment will be,
- (i) $\frac{1}{3}10^{10} \text{ J}$ (ii) $\frac{2}{3} \times 10^{10} \text{ J}$
(iii) $\frac{1}{2}10^{10} \text{ J}$ (iv) None of the above

NALANDA OPEN UNIVERSITY
Annual Examination, 2013
Intermediate of Science (I.Sc.), Part-I
PAPER-I (CHEMISTRY)

Time : 3 Hours

Full Marks : 80

Answer Five Questions. Question No. 1 is Compulsory. Attempt Two questions from Group 'A' and Group 'B'. All Questions carry equal Marks.

1. Choose the correct answer in the following :—
- (a) α -particles scattering experiment eventually led to the conclusion :—
(i) mass and energy are related (ii) electrons occupy space around nucleus
(iii) neutrons are present in nucleus (iv) protons are moving round the electrons
- (b) Which of the following configuration with atomic number 24 is correct ?
(i) $Ar(18)3d^4 4S^2$ (ii) $Ar(18)3d^6$ (iii) $Ar(18)3d^5 4S^1$ (iv) $Ar(18)4S^2 4p^4$
- (c) According to Bronsted and Lowry an acid
(i) donates electrons (ii) donates protons
(iii) accepts electrons (iv) accepts protons
- (d) A Lewis base,
(i) donates protons (ii) accepts protons
(iii) donates lone pair of electrons (iv) accepts lone pair of electrons
- (e) The specific reaction rate of a reaction depends on the
(i) concentration of reactant (ii) concentration of product
(iii) time (iv) temperature
- (f) In a chemical reaction catalyst is added to change the
(i) heat of reaction (ii) equilibrium
(iii) activation energy (iv) final product
- (g) When a radioactive substance is subjected to vacuum, the rate of disintegration
(i) increases (ii) decreases (iii) is not effected (iv) reduced to zero
- (h) Cinnabar is the ore of
(i) copper (ii) mercury (iii) silver (iv) zinc

Group 'A'

2. What is the constitution of Nucleus. Explain its stability by giving three its theories.
3. Write short notes on the following :—
(a) Aufbau Principle (b) Hund's Rule (c) Pauli's Exclusion Principle
4. Write down the basic assumptions of valence shell electron pair repulsion theory. Explain the water molecule structure and ammonia molecule structure on the basis of V.S.E.P.R. theory.
5. Define LEWIS ACID and LEWIS Base. Explain your answer with suitable examples.
6. Write notes on the following :—
(a) Oxidation Number (b) Nuclear Fusion (c) Carbon Dating

Group 'B'

7. How is ammonia manufactured by Haber's process. How does Ammonia react with heated copper and red hot platinum.
8. Explain the following :—
(a) Transition metals ions or compounds are generally paramagnetic.
(b) Which one of Fe^{++} or Fe^{+++} is more paramagnetic & why ?
(c) Transition metals have generally high melting and boiling point.
9. How washing soda is prepared by solvay process on large scale. Give its theory and reactions involved in this method of preparation.
10. Write short notes on the following :—
(a) Blue Vitrol (b) Gypsum (c) Potash Alum



Nalanda Open University
Annual Exam-2013,
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) For any three sets A, B and C, $A \times (B \times C)$ equals
 - (i) $(A \times B') \cup (A \times C')$ (ii) $A' \times (B \times C)$ (iii) $(A \times B) \cup (A \times C)$ (iv) $(A \times B) \cap (A \times C)$
 - (b) The number of sub-sets of a finite set S having n elements is
 - (i) n (ii) 2^n (iii) 2^{n-1} (iv) 2^{n+1}
 - (c) In the Complex plane, the locus of the point P(Z) satisfying $Z + \bar{Z} = 5$, represents
 - (i) a circle (ii) a line parallel to the real axis
 - (iii) a line parallel to the parallel to the imaginary axis (iv) line as infinity
 - (d) The harmonic mean between numbers a & b is
 - (i) $\frac{a+b}{2ab}$ (ii) $\frac{2ab}{a+b}$ (iii) $\frac{2(a+b)}{ab}$ (iv) $\frac{ab}{2(a+b)}$
 - (e) If α, β are the roots of the equation $x^2 + x + 1 = 0$, then $\alpha^3 + \beta^3$ equals
 - (i) 2 (ii) $\frac{1}{2}$ (iii) 2^2 (iv) 2^3
 - (f) The value of the sum ${}^n C_1 + {}^n C_2 + {}^n C_3 + \dots + {}^n C_n$ equals
 - (i) n (ii) 2^n (iii) $2^n - 1$ (iv) n - 1
 - (g) If A and B are matrices of order $m \times n$, then the product matrix AB is defined if
 - (i) $m \neq n^3$ (ii) $m = n$ (iii) $m = n^2$ (iv) every positive integral values
 - (h) If n is a non-natural number then $(1+x)^n$ can be expanded by generalized Binomial theorem if
 - (i) x is any real number (ii) $|x| < 1$ (iii) $-1 < x \leq 1$ (iv) $|x| \leq 1$.
 - (i) The general solution of the equation $\tan \theta = \tan \alpha$, is
 - (i) $\theta = n\pi - \alpha$ (ii) $\theta = n\pi + \alpha$ (iii) $\frac{n\pi}{2} - \alpha$ (iv) $\frac{n\pi}{2} + \alpha$
 - (j) In a triangle ABC, $A = \tan^{-1}2$, $B = \tan^{-1}3$, then C equals
 - (i) $\frac{\pi}{4}$ (ii) $\frac{\pi}{2}$ (iii) $\frac{\pi}{6}$ (iv) $\frac{\pi}{3}$.
 - (k) In the binomial expansion of $\left(2x - \frac{1}{3x^2}\right)^9$, the term independent of x is
 - (i) 3rd (ii) 4th (iii) 5th (iv) 6th
 - (l) The line through the point (1, -2) and making equal intercepts on the Co-ordinate axes, has its equation
 - (i) $x + y = 1$ (ii) $x - y = 1$ (iii) $x + y + 1 = 0$ (iv) $x - y + 1 = 0$

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(m) The line $y = x + \sqrt{2}$ is tangential to the circle $x^2 + y^2 = 1$, then λ equals

- (i) ± 1 (ii) $\pm\sqrt{2}$ (iii) ± 2 (iv) $\pm \frac{1}{\sqrt{2}}$

(n) The focus of the parabola $x^2 + 4x + 6y - 2 = 0$ is

- (i) $(-2, -1)$ (ii) $(-2, 0)$ (iii) $\left(-2, \frac{1}{2}\right)$ (iv) $\left(-2, -\frac{1}{2}\right)$

(o) The eccentricity of the ellipse $25x^2 + 16y^2 = 400$ is

- (i) $\frac{4}{5}$ (ii) $\frac{3}{5}$ (iii) $\frac{3}{4}$ (iv) $\frac{5}{7}$

(p) The condition for the tangency of the line $y = mx + c$ to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is that C^2 equals

- (i) $a^2m^2 + b^2$ (ii) $a^2m^2 - b^2$ (iii) $m^2b^2 - a^2$ (iv) $b^2m^2 - a^2$

2. (i) Define cartesian product of two non-empty sets let $A = \{1, 2, 3\}$, $B = \{1, 4, 6\}$, then find $A \times (B - C)$

(ii) What do you mean by a bijective map? Let $f : X \rightarrow Y$, where $X = \{a, b, c\}$ and $Y = \{7, 8, 9\}$. Give the design of 'f' so that its becomes bijection.

3. (i) For any two elements p and q in a Boolean Algebra, show that $p + p'q + q' + pp'q + q'p'q = 1$.

(ii) Construct the truth table for the statement $p + qr$.

4. (i) Find the square roots of $3 + 4i$

(ii) If $a^x = b^y = c^z$ and a, b, c are in G.P., then show that x, y, z are in H.P.

5. (i) If the ratio of the roots of the equation $ax^2 + bx + c = 0$ equals p : q. Prove that

$$\sqrt{\frac{p}{q}} + \sqrt{\frac{q}{p}} + \sqrt{\frac{c}{a}} = 0.$$

(ii) Show that the expression $\frac{x^2 - 3x + 4}{x^2 + 3x + 4}$ lies between 7 and $\frac{1}{7}$ for all real values of x.

6. (i) Use mathematical induction to prove that $10^n + 3 \times 4^{n+2} + 5$ is divisible by 9.

(ii) From 4 officers and 8 jawans, in how many ways 6 persons can be chosen so as to (a) include exactly one officer (b) include at least one officer.

7. (i) In how many ways can 11 boys and 12 girls can sit in a row so that no two boys be together?

(ii) Find a term (if possible) independent of x in the binomial expansion of $\left(x^2 + \frac{1}{5x}\right)^7$.

8. (i) If $A + B + C = \pi$, then prove that $\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C$.

(ii) Find the general solution of the trigonometric equation $\tan \theta + \tan 2\theta + \sqrt{3} \tan \theta \tan 2\theta = \sqrt{3}$.

9. (i) Determine the circum centre of the triangle whose vertices are $(-2, -3)$, $(-7, -6)$ and $(-1, 0)$.

(ii) Formulate the equations of internal bisector of angle between the line $3x - 4y + 1 = 0$ and $5x + 12y - 2 = 0$.

10. (i) Find the equation of the circle whose centre is $(3, 2)$ and touching the line $4x + 3y + 7 = 0$.

(ii) Compute the equation of the parabola whose focus and vertex are $(6, 4)$ and $(+2, 0)$ respectively.

Nalanda Open University
Annual Exam-2013,
Intermediate of Science, Part-I
Botany, 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 in following statements:
 - (i) Small pox is caused by
(a) Fungi (b) Virus (c) Protozoa (d) Bacteria
 - (ii) Stipule is the part of
(a) Flower (b) Leaf (c) Stem (d) Root
 - (iii) Edible part of apple is
(a) Fruit (b) Thalamus (c) Seed (d) All the above
 - (iv) Chloroplasts are spiral in
(a) Chlamydomonas (b) Bryophyta (c) Spirogyra (d) Nostoc
 - (v) Vessel is found in
(a) Phloem (b) Xylem (c) None of these (d) Both of these
 - (vi) A cell increases in volume when placed in a solution which one it is?
(a) Hypertonic (b) Isotonic (c) Hypotonic (d) None of these
 - (vii) Epiphytes grow on trees. This relation is known as
(a) Commensalism (b) Parasitism (c) Competition (d) Mutualism
 - (viii) Nitrogen is fixed in root nodules of legumes by
(a) Nostoc (b) Fungi (c) Rhizobium (d) Azotobacter
 - (ix) The reactions of glycolysis occurs in
(a) Mitochondria (b) Cytoplasm (c) None of the two (d) Both in (a) and (b)
 - (x) Annual ring helps in detecting one of the following
(a) Age of the plant (b) Thickness of stem (c) Hardness of Stem (d) None of the above
 - (xi) Binomial nomenclature was introduced by
(a) Aristotle (b) Theophrastus (c) Mendel (d) Carolus Linnaeus
 - (xii) Guard cells differ from epidermal cells in having
(a) Vacuole (b) Cell wall (c) Chloroplast (d) Vacuole
 - (xiii) Assimilatory power refers to
(a) Production of ATP and NADPH₂ (b) Reduction of CO₂
(c) Splitting of water (d) Disintegration of plastids
 - (xiv) CO₂ acceptor in C₃ plant is
(a) PGA (b) OAA (c) RUDP (d) PEPA
 - (xv) Replication of DNA is brought about by an enzyme called
(a) Polymerase (b) Reductase (c) Kinase (d) Oxidase
 - (xvi) Genes are composed of
(a) Protein (b) RNA only (c) DNA only (d) DNA and RNA
2. Describe the floral characters of Solanaceae with floral diagram and floral formula. Give botanical name of two common plants of this family.
3. Mention the detailed structure of a bacterial cell.
4. What is respiration? Give an account of Krebs Cycle.
5. Give an account of pond ecosystem.
6. What is sex linked inheritance? Describe this with examples.

or

Describe the process of crossing over and discuss its significance.
7. How will you prove that DNA is genetic material?
8. What is pollution? Describe the sources of water pollution and its control.
9. Describe the structure and function of Mitochondria.
10. Write short notes on any four of the following:
 - (a) Acid Rain (b) Annual Ring
 - (c) Golgi Bodies (d) Microbes in Industry
 - (e) Cereals (f) Cell Cycle

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Nalanda Open University
Annual Exam-2013, I.A/I.Sc./I.Com. Part-I
L L English Paper-I

Time: 3.00 Hrs.

Full Marks: 80

Candidates are required to give their answers in their own words as far as practicable.

Answer any five questions. Question no.1 is compulsory. All questions carry equal marks.

1. Choose the correct answer of each of the following questions from the options given below.
 - (i) Who has written "The Will and Testament"?
(a) M.K. Gandhi (b) R.K. Narayan (c) Jawahar Lal Nehru
 - (ii) What message does it Convey?
(a) Patriotism (b) Religious fervour (c) War
 - (iii) Why does Pandit Nehru want a handful of ashes thrown into the Ganga?
(a) Does it show his love for the river?
(b) Does it mean that Ganga is important for the Hindus?
(c) Does it show his love for his Country?
 - (iv) Who has written "The unity of Indian Culture"?
(a) Humayun Kabir (b) R.K. Narayan (c) E.H. Forster
 - (v) Is "The unity of Indian Culture"?
(a) an extract of novel (b) a political discourse (c) a speech extract
 - (vi) Do you think that Civilization and Culture are
(a) one and the same thing (b) interdependent (c) different from one another.
 - (vii) Who has written "An Astrologer's Day"?
(a)) R.K. Narayan (b) Rabindranath Tagore (c) E.M. Forster
 - (viii) Why did the astrologer leave his village?
(a) Looking for a job (b) for earning money (c) Because of his criminal act
 - (ix) Is "An Astrologer's Day"?
(a) an extract of a novel (b) A short story (c) An essay.
 - (x) Who has written "Ode on Solitude"?
(a) Alexander Pope (b) John Dryden (c) William Wordsworth
 - (xi) What is an Ode?
(a) a poem (b) a prose piece (c) a Satire
 - (xii) Why does the poet want to live unseen and die unlamented?
(a) He does not want popularity (b) He loves a quiet and peaceful death
(c) He does not Want name and fame.
 - (xiii) The poem "Martha" has been written by
(a) Shakespeare (b) Walter De La Mare (c) Shelley
 - (xiv) Martha in her stories tells us about
(a) ghosts and fairies (b) reality of life (c) love for one's country
2. Give your impression of Alexander the Great as a Warrior.
3. Bring out the charming qualities of Portia as a heroine.
4. Why is "Quit India Movement" significant in Indian history? Give reasons for your answer.
5. Write a critical appreciation of "Where the Mind is without fear".
6. What impression of "The Coming Man" have you formed after reading it? Narrate your impressions.

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Nalanda Open University

Annual Exam-2013

I.A/I.Sc./I.Com. Part-I

हिन्दी भाषा एवं साहित्य, पत्र –।

समय:—3 घंटे

पूर्णांक—80

प्रथम खंड से तीन और द्वितीय खंड तथा तृतीय खंड से एक-एक प्रश्न का उत्तर दीजिए ।
सभी प्रश्नों के अंक समान हैं ।

प्रथम खंड

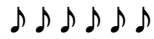
1. एक समाज—सुधारक के रूप में कबीरदास का मूल्यांकन कीजिए ।
2. सूरदास की भक्ति—भावना को स्पष्ट कीजिए ।
3. मीराबाई की विरह—वेदना की विशेषताओं का उल्लेख कीजिए ।
4. 'आँसू' के प्रतिपाद्य के बारे में अपना मत प्रस्तुत कीजिए ।
5. निराला द्वारा लिखित 'विधवा' शीर्षक कविता का भावार्थ अपने शब्दों में लिखिए ।
6. 'सुख—दुख' शीर्षक कविता के भावात्मक—सौन्दर्य का उद्घाटन कीजिए ।

द्वितीय खंड

7. 'रश्मि रथी' के आधार पर कर्ण का चरित्र—चित्रण कीजिए ।
8. 'भूमिजा' के आधार पर सीता के चरित्र की विशेषताएँ बताएँ ।

तृतीय खंड

9. महाकाव्य किसे कहते हैं? समझायें ।
10. रूपक, उपमा, उत्प्रेक्षा और अतिशयोक्ति अलंकार का लक्षण उदाहरण के साथ लिखिए ।



Nalanda Open University

Annual Exam-2013

I.A/I.Sc./I.Com. Part-I

हिन्दी राष्ट्रभाषा, पत्र - I

समय:-3 घंटे

पूर्णांक-100

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

खंड-1

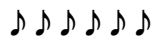
1. सूरदास की भक्ति-भावना को स्पष्ट कीजिए ।
2. बिहारी लाल का जीवन-परिचय दीजिए ।
3. भिक्षुक कविता की विशेषताओं पर प्रकाश डालिए ।
4. अर्थ स्पष्ट कीजिए –
(क) तरुवर फल नहीं खात है, सरवर पियहिं न पान ।
कह रहीम परकाज हित संपत्ति संचहि सुजान ॥
(ख) तरनि तनूजा तट तमाल तरुवर बहूँ छाये ।
झुके कूल सो जल परसन हित मनहूँ सुहाये ॥

खंड-2

5. 'साहित्य का स्वरूप' निबंध का सारांश लिखिए ।
6. रिपोर्ताज और यात्रा साहित्य में अंतर पर प्रकाश डालिए ।
7. सुभान खाँ का चरित्र चित्रण कीजिए ।
8. 'पत्नी' कहानी की विशेषताएँ बताइए ।

खंड-3

9. प्रयोजनमूलक हिन्दी के विविध रूप तथा व्यवहार क्षेत्र का निर्धारण कीजिए ।
10. सम्प्रेषण के विविध रूपों का परिचय दीजिए ।



Nalanda Open University
Annual Exam-2013
I.A/I.Sc./I.Com. Part-I
(Hindi Composition) हिन्दी राष्ट्रभाषा
अहिन्दी भाषियों के लिए

समय:-1 $\frac{1}{2}$ घंटे

पूर्णांक-50

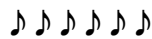
प्रत्येक खण्ड से प्रश्न चयन करते हुए कुल पाँच प्रश्नों के उत्तर लिखिए । सभी प्रश्नों के अंक समान हैं ।

खंड-क

1. कबीर की कविताओं के भाव-सौन्दर्य पर दृष्टि डालिए ।
2. 'विश्व वेदना' शीर्षक कविता का भावार्थ लिखिए ।
3. रहीम के काव्य का मूल उद्देश्य क्या है? विवेचना कीजिए ।
4. 'स्वाधीन भारत की सेना' के उद्देश्य पर प्रकाश डालिए ।
5. व्याख्या कीजिए :
 - (क) बड़ी जलन है इस ज्वाला में
जलना कोई खेल नहीं है ।
इधर देखता हूँ करुणा से
मानवता का मेल नहीं है ॥
 - (ख) जे गरीब पर हित करें ते रहीम बड़ लोग ।
कहा सुदामा बापुरो, कृष्ण मितार्ई जोग ।

खंड-ख

6. 'पूस की रात' कहानी के कथा-नायक का चरित्र चित्रण कीजिए ।
7. आलोच्य रेखाचित्र के आधार पर बिन्दा का चरित्र चित्रण कीजिए ।
8. राहुल सांकृत्यायन का परिचय दीजिए ।
9. रिपोर्ताज लेखन में फणीश्वर नाथ रेणु की भूमिका का वर्णन कीजिए ।
10. उर्मिला के विषय में भारतीय कवियों ने कैसी उदासीनता दिखलाई है?



NALANDA OPEN UNIVERSITY

Intermediate of Science (I.Sc.)

Mathematics

PART-II, PAPER-II

Annual Examination, 2013

Time : 3 Hours.

Full Marks : 80

Answer any five questions, while Question No. 1 is compulsory. All questions carry equal marks.

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

- (a) The value of $\lim_{x \rightarrow 0} \frac{\log \cos x}{x}$ is equal to, (i) 1 (ii) 0 (iii) -1 (iv) ∞
- (b) If $xy = 1$, then $\frac{dy}{dx}$ equals to, (i) xy (ii) $\frac{y}{x}$ (iii) $\frac{-y}{x}$ (iv) $\frac{-x}{y}$
- (c) The instantaneous time rate of change of the function $f(t) = e^{-t}(t + 9e^t)$ at $t = 1$, is equal to, (i) 1 (ii) -1 (iii) 0 (iv) 9
- (d) The function $f(x) = x^3 + 5$ is an increasing function for
(i) $x \in R$ (ii) $x \in [0, +\infty[$ (iii) $x \in]-\infty, 0]$ (iv) no where in R
- (e) The point of inflexion of $x^3 - 3x^2 + 3x + 7$, is
(i) $x = 0$ (ii) $x = 1$ (iii) $x = -1$ (iv) $x = 2$
- (f) $\int \log x \, dx$ equals
(i) $\frac{1}{x} + c$ (ii) $e^x + c$ (iii) $x \log\left(\frac{x}{e}\right) + c$ (iv) $x \log x + c$
- (g) The value of the integral $\int_0^1 \frac{dx}{\sqrt{1-x^2}}$ equals, (i) $\frac{\pi}{2}$ (ii) π (iii) 2π (iv) $\frac{\pi}{4}$
- (h) The general solution of $\frac{dy}{dx} = \frac{y}{x}$ is,
(i) $y = e^x + c$ (ii) $x = e^y + c$ (iii) $y = cx$ (iv) $y = ce^x$
- (i) If \hat{u} is a non-zero unit vector and λ is a scalar such that $\lambda\hat{u}$ becomes unit vector, then λ equals, (i) 1 (ii) -1 (iii) 0 (iv) not defined
- (j) If \vec{a} , \vec{b} and $\vec{a} + \vec{b}$ be unit vectors, then the angle between \vec{a} and \vec{b} is,
(i) $\frac{\pi}{6}$ (ii) $\frac{\pi}{4}$ (iii) $\frac{\pi}{3}$ (iv) $\frac{\pi}{2}$
- (k) The $x - z$ plane divides the line joining the points (1, 3, 5) and (5, -6, 4) in the ratio, (i) $\frac{1}{2}$ (ii) 2 : 1 (iii) 1 : 3 (iv) 1 : 4
- (l) The probability of having 53 Sundays in a non-leap year is,
(i) $\frac{2}{7}$ (ii) $\frac{1}{7}$ (iii) $\frac{52}{365}$ (iv) $\frac{53}{365}$
- (m) A particle moving under uniform acceleration 'f' and initial velocity 'u' will describe $u + \frac{1}{2}f(2n - 1)$ distance in,
(i) n^{th} second (ii) $(n - 1)$ seconds (iii) $2n$ seconds (iv) $2n - 1$ seconds

- (n) A particle is projected vertically upwards with a velocity 56 m/s and the acceleration due to gravity is 9.8 m/s^2 , then the greatest height ascended is,
 (i) 320 m (ii) 160 m (iii) 80 m (iv) 98 m
- (o) Two like parallel forces P and $2P$ are acting at two points distant 3 units. Then the distance of their resultant from P is,
 (i) 2 units (ii) 1 unit (iii) $\frac{5}{2}$ units (iv) $\frac{3}{2}$ units
- (p) The magnitude of the resultant force (complainer) Panel $\sqrt{3}P$ inclined at 30° with each other is,
 (i) $7P$ (ii) $\sqrt{7}P$ (iii) $5P$ (iv) $\sqrt{5}P$
2. Draw the graph of the function $f(x) = |x|$ and examine its continuity and differentiability at the origin.
3. Derive the value of $\frac{dx}{dy}$ from the relation $x^{\sin x} + y = (\tan x)^{x^2}$.
4. (a) Find the equation of the normal to the curve $x^2 + y^2 + 4x - 6y = 0$ at the point (1, 1).
 (b) Show that the maximum value of the function $x + \frac{1}{x}$ is less than its minimum value.
5. Evaluate the following integrals :—
 (a) $\int \frac{\cos^{-1}x}{\sqrt{1-x^2}} dx$ (b) $\int (\log x)^3 dx$.
6. Compute the value of integral given below :—
 (a) $\int_0^{\pi/2} \frac{\sqrt{\tan x}}{\sqrt{\cot x} + \sqrt{\tan x}} dx$ (b) $\int_0^1 \frac{x^2 dx}{(a+bx)^2}$
7. Solve the following differential equations :—
 (a) $\frac{dy}{dx} + y = xy^3$ (b) $e^{\frac{dy}{dx}} = x + 1$, where $y(0) = 5$
8. (a) Let A and B be two points having position vectors \vec{a} and \vec{b} respectively with reference to the origin 0 and c is a point on AB dividing it in the ratio $m : n$, then show that position vector of c is $\frac{m\vec{b} + n\vec{a}}{m+n}$.
 (b) Show that the vectors $\hat{i} - 3\hat{j} + 2\hat{k}$, $2\hat{i} - 4\hat{j} - 4\hat{k}$ and $3\hat{i} + 2\hat{j} - \hat{k}$ are linearly independent.
9. (a) Introduce the concept of moment of a force about a point and establish the varignon's theorem on moments.
 (b) Forces 1N, 2N, 3N, 4N and $2\sqrt{2}$ N act at a point in directions AB, BC, CD, DA and AC where ABCD is a square. Show that the forces are in equilibrium.
10. (a) Find the resultant of two velocities u and v making α angle with each other.
 (b) A stone is thrown horizontally with a velocity $\sqrt{2gh}$ from the top of the tower of height h . Find the point where it strikes the ground level through the foot of the tower.
11. (a) Define conditional probability and apply it in the establishment of Baye's theorem.
 (b) A can hit a target thrice in 5 shots, B twice in 5 shots and C thrice in 4 shots. Find the probability of two shots hitting the target.

NALANDA OPEN UNIVERSITY
Annual Examination, 2013
Intermediate of Science (I.Sc.), Part-II
PAPER-II (CHEMISTRY)

Time : 3 Hours

Full Marks : 80

Answer Five Questions. Question No. 1 is Compulsory. Attempt Two questions from Group 'A' and Group 'B'. All Questions carry equal Marks.

1. Choose the correct answer in the following :—
- (a) The volume of a given mass of a gas at constant temperature is inversely proportional to its pressure, is statement of
(i) Boyle's Law (ii) Charles Law (iii) Avogadro's Law (iv) None of these
- (b) In which of the following reaction $K_p = K_c$.
(i) $Pcl_3 + cl_2 \rightleftharpoons Pcl_5$ (ii) $CH_3COOH(l) + C_2H_5OH(l) \rightleftharpoons CH_3COOC_2H_5 + H_2O(l)$
(iii) $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$ (iv) $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$
- (c) If in NH_4OH solution NH_4Cl is added, concentration of OH^- decreases because of
(i) hydrolysis (ii) common ion effect
(iii) dissociation of NH_4Cl (iv) solubility of NH_4Cl
- (d) 100 ml $\frac{M}{10} H_2SO_4$ solution is added to 100 ml $\frac{M}{10} NaOH$ solution, the resulting solution was made 1 liter by adding water, the p_H of the solution of will be
(i) 7 (ii) 2 (iii) 12 (iv) 1
- (e) The apparatus is used for electrolysis is called
(i) Electro chemical cell (ii) Voltmeter
(iii) Coulometer (iv) All of the above
- (f) The same quantity of electricity is passed through $CuSO_4$ and $AgNO_3$ solution. If mass of Cu (at.wt = 63.5) deposited was 6.35 gm then mass of Ag (at.wt = 108) deposited was
(i) 21.6 gm (ii) 2.16 gm (iii) 6.35 gm (iv) 10.8 gm
- (g) The hybridisation of carbon in Methane is, (i) Sp (ii) Sp^2 (iii) Sp^3 (iv) dSp^2
- (h) Ethyl alcohol (C_2H_5OH) and dimethyl ether (CH_3OCH_3) both have same molecular formula but they differ in their chemical properties, such isomerism is shown by
(i) Position Isomerism (ii) Metamerism
(iii) Functional isomerism (iv) Chain isomerism

Group 'A'

2. Define and explain Dalton's Law of partial pressure of a gas. Establish a relationship between partial pressure of gas and total pressure in a mixture.
3. Show that fcc and bcc lattice consists of 4 and 2 atoms per unit cell. Calculate the void space in simple cubic lattice.
4. State and explain Hess's law of constant Heat Summation. What are its application ?
5. State law of mass action and deduce expression for equilibrium constant for the reaction $nA + mB \rightleftharpoons xC + yD$. Establish relationship between K_p and K_c .
6. Write notes on the following :—
(a) Buffer Solution (b) Common ion effect (c) p_H of a solution

Group 'B'

7. How is formic Acid prepared in the Laboratory ? How does it differ from acetic acid ?
8. How is first member of alkyne prepared ? Give its reaction with
(a) 20% H_2SO_4 at 80°C in presence of 1% $HgSO_4$. (b) Treated with Na in liquid NH_3
(c) Treated with H_2 in presence of $Pd / BaSO_4$ (d) Treated with HCN.
9. Give two different methods of preparation of aldehyde & ketone. How does aldehyde react with following :— (a) NaOH solution (b) Tollen reagent (c) Phenyl hydrazine
Give equation to explain your answer.
10. (a) Explain the term Polymers and polymerisation.
(b) Write short notes on the following :— (i) P.V.C (ii) Polyester

NALANDA OPEN UNIVERSITY

Annual Examination, 2013

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

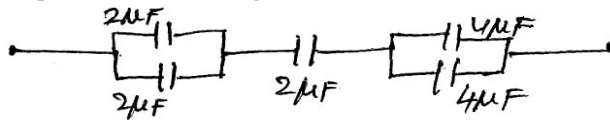
PAPER-II (Physics)

Time : 3 Hours

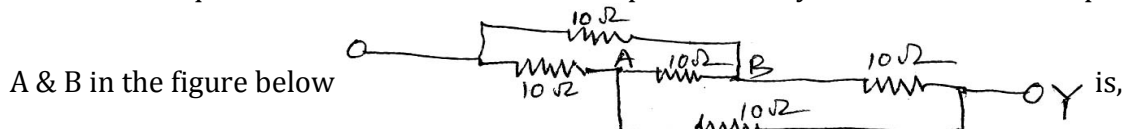
Full Marks : 80

Answer any Five Questions, in which 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) Total internal reflection may occur when a ray travels from,
(i) air to water (ii) air to glass
(iii) vacuum to air (iv) glass to water
- (b) Which of the following optical instruments contains a diverging lens in addition to converging lens,
(i) Simple microscope (ii) Compound microscope
(iii) Galilean telescope (iv) Astronomical telescope
- (c) A normal human eye is said to be under maximum strain in order to see object at,
(i) Far point (infinite distance) (ii) Near point (or L.D.D.V.)
(iii) Double the near point (iv) Any where beyond near point
- (d) According to Rayleigh's theory of scattering,
(i) Blue wavelengths are scattered less than red
(ii) Red wavelengths are scattered less than blue
(iii) Amounts of scattering for both blue and red wavelengths are same
(iv) Yellow light is most scattered while blue & red less scatter.
- (e) Which of the following statements is false,
(i) LASER light is highly monochromatic (ii) LASER light is highly coherent
(iii) LASER light cannot be sharply focused (iv) LASER light is highly directional
- (f) Two thin lenses of focal length 20 cm and -40 cm are placed in contact. The power of the combination is,
(i) 5D (ii) -7.5 D
(iii) 10 D (iv) 2.5 D
- (g) The equivalent capacitance of the given combination is



- (i) $14 \mu F$ (ii) $11 \mu F$
(iii) $\frac{8}{7} \mu F$ (iv) $5 \mu F$
- (h) Measurement of resistance with meter bridge is based on the principle of,
(i) De Sauty's bridge (ii) Anderson's bridge
(iii) Wheatstone bridge (iv) None of these
- (i) The ratio of equivalent resistance between the points x and y to that between the points



- (i) 1 : 1 (ii) 2 : 1
(iii) 4 : 1 (iv) 5 : 1
- (j) Two wires of the same length are shaped into a square and a circle respectively and they carry the same current. Then, the ratio of their magnetic moments is,
(i) $2 : \pi$ (ii) $\pi : 2$
(iii) $4 : \pi$ (iv) $\pi : 4$

- (k) 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,
- (i) π (ii) $\pi/2$
 (iii) $\pi/4$ (iv) 0
- (l) A moving coil galvanometer gives a full scale deflection when a $1 \mu\text{A}$ current passes through it. If the resistance of the galvanometer is 1,000 ohms then the shunt to be used to convert the galvanometer into 1A ammeter is,
- (i) $10^{-3}\Omega$ (ii) $10^{-2}\Omega$
 (iii) $10^{-1}\Omega$ (iv) 1Ω
- (m) The Balmer series of spectral lines arise from,
- (i) $n \rightarrow 2$ (ii) $n \rightarrow 1$
 (iii) $n \rightarrow 3$ (iv) $n \rightarrow 4$
- (n) The de Broglie wavelength of electrons of kinetic energy 5 keV is nearly,
- (i) 1.6\AA (ii) 0.16\AA
 (iii) 0.016\AA (iv) 16\AA
- (o) The current flowing in an intrinsic n – p junction rectifier is related to the bias voltage V as,
- (i) $I = I_0$ (ii) $I = V/R$
 (iii) $I = I_0(e^{eV/kT} - 1)$ (iv) $I = I_0(e^{eV/kT} + 1)$
- (p) For a transistor, the parameter β has the value 99 then the parameter α will have the value,
- (i) 0.9 (ii) 1.0
 (iii) 0.99 (iv) 9.0

- Explain what you mean by (i) deviation and (ii) dispersion by a prism. What is the maximum and minimum deviation? How can deviation with dispersion be achieved?
- What is scattering of light? How can you explain the phenomena of (i) Blueness of sky (ii) Redness of sun at the time of sunset or sunrise & (iii) formation of Rainbow in the sky? What do you mean by secondary rainbow?
- Derive relevant formula for diffraction of light by a single slit.
- With the help of a neat diagram, derive the lens maker's formula. What are the assumptions in making the derivation of the formula?
- Derive Snell's law of refraction on the basis of Huygen's principle. Distinguish clearly between coherent and non-coherent sources of light.
- Obtain the formula for the electric potential and field due to an electric dipole. What is the force and torque experienced by a dipole placed in a uniform electric field.
- 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.
- Describe the construction and action of a moving coil galvanometer. Explain how it can be converted into (i) an ammeter & (ii) a voltmeter.
- What is Bohr model of Atoms? How can this be used to describe different types of series spectra in Hydrogen atom?



Nalanda Open University
Annual Exam-2013,
Intermediate of Science, Part-II
Zoology, 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 2 marks.
 - (i) At what stage the chromosomes are arranged on equatorial plane?
(a) Prophase (b) Metaphase (c) Anaphase (d) Telophase
 - (ii) Gametes are formed during
(a) Spermatogenesis (b) Oogenesis (c) Gametogenesis (d) Fertilization
 - (iii) Leydig Cells are found in:
(a) Ovary (b) Vasa deferens (c) Testis (d) Stroma
 - (iv) Which one is disaccharides:
(a) Ribose (b) Fructose (c) Lactose (d) Peptose
 - (v) Mammalian heart is:
(a) 2-Chambered (b) 4-Chambered (c) Single Chambered (d) 3-Chambered
 - (vi) Theory of Natural Selection was given by:
(a) Lamark (b) Darwin (c) Weismann (d) Wallace
 - (vii) Colleteral gland is found in:
(a) Earthworm (b) Cockroach (c) Pila (d) Starfish
 - (viii) Which of the following endocrine glands secrete insulin?
(a) Pituitary (b) Adrenal (c) Thyroid (d) Isbt of Langerhans
2. Write short notes on any two of the following:
(a) Mutation (b) DNA fingerprinting (c) Gastrulation (d) Contractile vacuoles
3. Describe the structure and classification of protein.
4. Write an essay on variation.
5. Describe the respiratory system of frog.
6. Give an account of pituitary gland.
7. Give an account of three-germinal layers of frog in the course of its development.
8. Describe the reproductive system of cockroach.
9. Describe the mitotic cell division in an animal cell.
10. Describe the digestive system of Earthworm.

Nalanda Open University
Annual Exam-2013, I.A/I.Sc./I.Com. Part-II
L L English Paper-II

Time: 3.00 Hrs.

Full Marks: 80

Answer all Question. The figure in the margin indicate full marks.

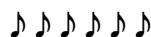
1. Write an essay in about 250 words on any one of the following:- 20
 - (a) Winter Flowers
 - (b) A Book Fair you have visited
 - (c) An interesting Cricket Match
 - (d) Evils of Corruption in India
 - (e) Rising Prices
 - (f) Discipline.
2. Write a letter to your father, explaining what you propose to do after examination. 15

Or

Write a letter to the Mayor, PMC, requesting him to take urgent steps for removing the garbage that has accumulated in your wealth.
3. Turn the following into Indirect speech: 05
 - (a) The officer said, "I have not been able to finish my work this evening".
 - (b) He said to me, "The rain has been falling since day break and you can not go unless it stops".
 - (c) The teacher said, "Sweet are the uses of adversity".
 - (d) The teacher said to me, "What are you doing?"
 - (e) He said to me, "Give me your pencil".
4. Fill in the blanks with suitable Prepositions: 05
 - (a) The tiger was killed the hunter a gun.
 - (b) It has been raining yesterday.
 - (c) He stayed here Sunday Thursday.
 - (d) He remained confined bed weeks.
 - (e) I congratulated him his success.
5. Turn the following into Passive Voice. 05
 - (a) All the boys laughed at him.
 - (b) Mohan gave him a book.
 - (c) Do not insult the poor.
 - (d) Columbus discovered America.
 - (e) The dog bit him on the leg.
6. Put the verbs in brackets in sentences below in their correct form of tense: 05
 - (a) Mohan (teach) in this school since 1970. Before he (come) here, he (live) in Delhi. Now he (live) in a village and (come) to school everyday by train.
7. Fill in the blanks with Who, Which and That. 05
 - (a) There lived a king in Great Britain, had three daughters.
 - (b) The tree under he was standing fell down.
 - (c) The aeroplane took off at 12 noon reached safely.
 - (d) I love my mother brought me up with a great care.
 - (e) The king was crowned yesterday looked majestic.
8. Use the following in your own sentences:- 10

Make out; Make up; Put down; Put up; Put up with; See through; Stand against; Stand by; Set out; Sat in.
9. Translate the following into English:- 10

तुलसीदास ने रामायण की रचना की । इसमें रामचन्द्र जी की कहानी है । इन्होंने रावण को मारकर लोगों की भलाई की । अन्त में सीता सहित वे अयोध्या लौट आये । वे आदर्श पुरुष थे ।



प्रत्येक खंड से प्रश्नों का चयन करते हुए कुल पाँच प्रश्नों के उत्तर दीजिए ।
सभी प्रश्नों के अंक समान हैं ।

प्रथम खंड

1. गोपियों की भगवद्भक्ति की विशेषताएँ बताएँ ।
2. 'नई समीक्षा प्रणाली' के अनुसार समीक्षा के क्या आधार हैं?
3. साहित्य कैसे जातीय विद्वेष दूर कर सकता है?
4. "सड़क कोरा सिद्धांत ही नहीं जानती, कर्म भी जानती है" - स्पष्ट कीजिए ।
5. 'शतरंज के खिलाड़ी' कहानी का सारांश लिखिए ।
6. 'रीढ़ की हड्डी' की कथावस्तु का विश्लेषण कीजिए ।

द्वितीय खंड

7. मनोजशंकर की चारित्रिक विशेषताओं को उद्घाटित कीजिए ।
8. 'अशोक' के शिल्प पर विचार कीजिए ।

खंड-ग

9. भक्तिकाल की पृष्ठभूमि का संक्षेप में वर्णन कीजिए ।
10. कबीर और भारतेन्दु का परिचय दीजिए ।

♪ ♪ ♪ ♪ ♪ ♪