

# Nalanda Open University

Annual Examination - 2014

B.Sc. Physics (Honours), Part-I

Paper-I

Time: 3.00 Hrs.

Full Marks: 80

Answer any **Five** questions, selecting at least one from each group. All questions carry equal marks.

## Group - A

1. Define the divergence and Curl of a vector. Give the physical meaning of these quantities.
2. Setup the Lagrangian for a (i) one dimensional harmonic oscillator & (ii) particle of mass  $m$  falling freely in uniform gravitational field. Write equations of motion in each case using Lagrange's equations.
3. What are Kepler's laws of planetary motion? Deduce these laws on the basis of Newton's law of gravitation.
4. Define Scattering Cross-section. Derive Rutherford Scattering formula for the differential Scattering Cross-section of particles in the force field of an inverse square law of force.
5. Write short notes on any **Two** of the following :  
(a) D'Alembert's principle                      (b) Coriolis force                      (c) Green's theorem  
(d) Generalized coordinates

## Group - B

6. Describe, with a neat diagram, the Michelson-Morley experiment and explain clearly the conclusions drawn from this experiment.
7. Establish the following equations for a relativistic system :  
(a)  $E^2 = p^2 c^2 + m_0^2 c^4$  & (b)  $p = \frac{1}{c} \sqrt{K^2 + 2m_0 c^2 K}$ ,  
where the symbols have the usual meaning.
8. Write short note on any **Two** of the following :  
(a) Lorentz-Fitzgerald Contraction  
(b) Basic postulates of special theory of relativity

## Group - C

9. Write the one dimensional differential equation for damped vibration and find the solution. Hence, give the full description of the motion in this case.
10. Write short notes on :  
(a) Ultrasonic Waves  
(b) Vibration of a rectangular membrane.



## Examination Programme, 2014

B.Sc (Part – I) All Honours Subjects

Except Home Science and Geography Honours

Date	Papers.	Time	Examination Centre
12/6/2014	(Hons) P-I	8 to 11 am	Nalanda Open University, Patna
14/6/2014	(Hons) P-II	8 to 11 am	Nalanda Open University, Patna
16/6/2014	Rastrabhsha-100 or Hindi +Urdu 100	8 to 11 am	Nalanda Open University, Patna
18/6/2014	Botany (Sub) P-I	8 to 11 am	Nalanda Open University, Patna
19/6/2014	Math (Sub) P-I	8 to 11 am	Nalanda Open University, Patna
20/6/2014	Geography (Sub) P-I	8 to 11 am	Nalanda Open University, Patna
21/6/2014	Chemistry (Sub) P-I	8 to 11 am	Nalanda Open University, Patna
23/6/2014	Physics (Sub) P-I	8 to 11 am	Nalanda Open University, Patna
24/6/2014	Home Scince (Sub)-P I	8 to 11 am	Nalanda Open University, Patna
25/6/2014	Zoology (Sub) P-I	8 to 11 am	Nalanda Open University, Patna

# Nalanda Open University

Annual Examination - 2014

B.Sc. Physics (Honours), Part-I

Paper-II

Time: 3.00 Hrs.

Full Marks: 80

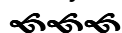
Answer any Five questions, selecting at least two from each group. All questions carry equal marks.

## Group - A

1. Derive the expression for mean free path  $\lambda$  of gas molecules on the basis of Kinetic theory of gases. How is this quantity experimentally determined?
2. Derive Van-der-Wall's equation of state for real gases using Virial theorem. What is the importance of  $a$  &  $b$ ?
3. Describe the Einstein's theory of Brownian Motion and obtain the expression for average square displacement of a particle. Compare this with Langevin's theory of Brownian motion.
4. State the principle applied by Planck for the energy of an oscillator. Derive Planck's radiation formula and give its application.
5. Write short notes on any **Two** of the following :
  - (a) Equipartition of energy
  - (b) Critical constants  $P_c$ ,  $V_c$  &  $T_c$
  - (c) Rayleigh Jean's law
  - (d) Wien's displacement law.
  - (d) Generalized coordinates

## Group - B

6. State Ish law of thermodynamics and use this to express rate of change of internal energy of gas under different conditions i.e. expressing  $U$  as for of two of three variables  $P$ ,  $V$  &  $T$  in three different ways.
7. Derive the expression for efficiency of Carnot's engine using and law of thermodynamics. Define Carnot's refrigerator.
8. Derive Calnsives-Clapeyron equation of 1st order phase transition and explain triple point give suitable diagram.
9. Describe porons-plug experiment. What is Joule-Thomson effect?
10. State and explain the statistical basis of thermodynamics. Also, give the statistical interpretation of 2nd law of the thermodynamics.



## Practical Programme, 2014

Programme of B.Sc. Part-I Physics (Hons.) Practical Counselling and Examination-2014

Venue-Physics Lab, 1st Floor, Biscomaun Tower, Patna

### Counselling Class

Date	Time	Batch	Roll No.
30/06/2014 to 02/07/2014	12:00 to 4:00 PM	P1	120500073 to 120500074 130500001 to 130500030
03/07/2014 to 05/07/2014	12:00 to 4:00 PM	P2	130500031 to 130500070
07/07/2014 to 09/07/2014	12:00 to 4:00 PM	P3	130500071 to 130500111

### Practical Examination

Date	Time	Batch	Paper	Roll No.
10/07/2014	11:30 to 02:30 PM	P1	I	120500073 to 120500074 130500001 to 130500030
	02:45 to 5:45 PM		II	"
11/07/2014	11:30 to 02:30 PM	P2	I	130500031 to 130500070
	02:45 to 05:45 PM		II	"
12/07/2014	11:30 to 02:30 PM	P3	I	130500071 to 130500111
	02:45 to 05:45 PM		II	"

**Nalanda Open University**  
**Annual Examination - 2014**  
**B.Sc. Physics (Subsidiary), Part-I**  
**Paper-I**

**Time: 3.00 Hrs.**

**Full Marks: 80**

*Answer any Five questions. All questions carry equal marks.*

1. Explain, with the help of Lorentz transformation, equations, (i) Length Contraction and (ii) Time dilation and prove them.
2. State and explain Einstein's postulates of special theory of relativity. Distinguish between Galilean and Lorentz transformations.
3. State Kepler's laws of planetary motion and derive the third law.
4. Obtain the expression for depression of a Cantilever beam when a force  $W$  is applied at its free end.
5. Evaluate the Fourier Coefficients in the solution for motion of a plucked String.
6. Explain the behaviour of real gases and derive Van-der-Waal's equation of state for such gases.
7. State and explain 1st law of thermodynamics and use it to obtain (i) difference of  $C_p$  and  $C_v$  & (ii) Law governing and adiabatic process.
8. Derive Stefan-Boltzmann law. Also, write down Wien's distribution law and Rayleigh Jean's law.
9. Set up the lagrangian for a one-dimensional harmonic Oscillator and obtain the Lagrange's equation of motion.
10. Write short notes on *Two* of the following :
  - (a) Planck's law of radiation
  - (b) Aberration of light
  - (c) Clausius-Clapeyron equation
  - (d) Entropy.



*Programme of B.Sc. Physics (Subsidiary), Part-I*  
*Practical Counselling Class and Examination, 2014*  
*Venue : 1st Floor, Biscomaun Tower, Patna*

**Programme of B.Sc. Part-I Physics Subsidiary Practical Counselling Class-2014**

Date	Time	Batch	Subsidiary Paper	Honours Papers & Roll No.
18.07.2014	12:00 to 4:00 PM	P1	Physics	All Chemistry (Hons.) Students
19.07.2014	12:00 to 4:00 PM	P2	Physics	All Zoology, Botany & Geography (Hons.) Students
21.07.2014	12:00 to 4:00 PM	P3	Physics	All Old Students of Math (Hons.) & 130490001 to 130490023
22.07.2014	12:00 to 4:00 PM	P4	Physics	130490024 to 130490049
23.07.2014	12:00 to 4:00 PM	P5	Physics	130490050 to 130490083
24.07.2014	12:00 to 4:00 PM	P6	Physics	130490084 to 130490136

**Programme of B.Sc. Part-I Physics Subsidiary Practical Exam-2014**

Date	Time	Batch	Subsidiary Paper	Honours Papers & Roll No.
30.07.2014	11:30 to 2:30 PM	P1	Physics	All Chemistry (Hons.) Students
30.07.2014	2:45 to 5:45 PM	P2	Physics	All Zoology, Botany & Geography (Hons.) Students
01.08.2014	11:30 to 2:30 PM	P3	Physics	All Old Students of Math (Hons.) & 130490001 to 130490023
01.08.2014	2:45 to 5:45 PM	P4	Physics	130490024 to 130490049
02.08.2014	11:30 to 2:30 PM	P5	Physics	130490050 to 130490083
02.08.2014	2:45 to 5:45 PM	P6	Physics	130490084 to 130490136

**Nalanda Open University**  
**Annual Examination - 2014**  
**B.Sc. Physics (Honours), Part-II**  
**Paper-III (Optics & Electromagnetic Theory)**

**Time: 3.00 Hrs.**

**Full Marks: 80**

*Answer any Three questions from group 'A' and Two from group 'B'. All questions carry equal marks.*

**Group - A (Optics)**

1. Explain the construction and mode of action of a plane diffraction grating and derive the expression for its R.P.
2. Explain the formation of fringes in Feby-Perot interferometer. How would you use it for the measurement of wavelength of light.
3. What is experimental arrangement and theory formation of Newton's ring? How to determine the wavelength of sodium light.
4. Describe the construction and working of Nicol Prism. How is it used as a polariser and analyser?
5. What do you understand by resolving power of a an optical instrument. Explain Reyleigh criterion of resolution. What is Resolving Power of a Telescop whose objective lens has diameter of 200 inches and  $\lambda = 6000\text{\AA}$ .
6. What are Einstein's A and B co-efficient? Derive the ratio of these two co-efficients.

**Group - B (Electromagnetic Theory)**

7. Derive Rayleigh Scattering formula of a electromagnetic wave by a bound charge.
8. Explain the laws of reflection of plane waves at the interface of non conducting media on the basis of electromagnetic field.
9. Obtain Ponyting theorem for electromagnetic field. Also give expression for mechanical and electromagnetic momentum.
10. Write notes on any **Two** of the following:-
  - (a) Maxwell's stress Tensor
  - (b) Pressure of Radiation
  - (c) Thomson Scattering
  - (d) Dispersion in Gases



**Examination Programme, 2014**

**(Bachelor Of Science (Part-II))**

**All Subjects Except B.Sc Geography & Home Science (Honours)**

Date	Paper	Time	Name of Examination Centre
21/5/2014	HONOURS PAPER – III	3.30 to 6.30 pm	Nalanda Open University, Patna
23/5/2014	HONOURS PAPER – IV	3.30 to 6.30 pm	Nalanda Open University, Patna
27/5/2014	(SUB.) (Mathematics - II)	8.00 to 11.00 am	Nalanda Open University, Patna
28/5/2014	(SUB.) (Home Science- II)	<b>12.00 to 3.00 pm</b>	Nalanda Open University, Patna
29/5/2014	(SUB.) (Chemistry - II)	8.00 to 11.00 am	Nalanda Open University, Patna
30/5/2014	(SUB.) (Zoology - II)	8.00 to 11.00 am	Nalanda Open University, Patna
31/5/2014	Hindi 100 orUr 50+Hn50	<b>3.30 to 6.30 pm</b>	Nalanda Open University, Patna
02/6/2014	(SUB.) (Botany - II)	8.00 to 11.00 am	Nalanda Open University, Patna
02/6/2014	(SUB.) (Physics- II)	8.00 to 11.00 am	Nalanda Open University, Patna
04/6/2014	(SUB.) (Geography -II)	8.00 to 11.00 am	Nalanda Open University, Patna

***Programme of B.Sc. Part-II Physics (Hons.),***

***Practical Counselling Class and Examination, 2014***

***Venue:- Physics Lab, 1st Floor, Biscomaun Tower, Patna***

**(A) Practical Counselling Class**

Date	Time
05.06.2014 to 07.06.2014	12:00 Noon to 4:00 PM

**(B) Practical Examination**

Date	Time	Paper
10.06.2014	11:30 AM to 2:30 PM	III
	2:45 PM to 5:45 PM	IV

# Nalanda Open University

Annual Examination - 2014

B.Sc. Physics (Honours), Part-II

Paper-IV (Electrostatics and Magnetism, Current, Electricity and Modern Physics)

Time: 3.00 Hrs.

Full Marks: 80

Answer any Five questions. All questions carry equal marks.

1. Find the electrostatics potential due to uniform circular disc of charge ' $q$ ' and unit radius.
2. Express Laplace equation in Cartesian, Spherical polar and Cylindrical polar Coordinates. Give importance of this equation. What is Poisson's equation?
3. Describe Langevin's by weiss to explain the phenomenon of ferromagnetism.
4. Define Thomson and Petlier Coefficient. Show that, in a thermocouple AB, the total emf is given by :  $E = \pi + \int_{T_1}^{T_2} (\sigma_A - \sigma_B) dT$ , where symbol have their usual meaning.
5. Give theory, Construction and action of a moving Coil ballistic galvanometer. Give some important applications of this galvanometer.
6. Explain the working of Anderson's bridge for measurement of the inductance of a coil with the help of circuit diagram and vector diagram.
7. Obtain the resonance frequency of parallel resonant circuit. Discuss the sharpness of the resonance circuit.
8. Describe the Millikan's oil drop experiment to find the charge of an electron.
9. State and explain Compton effect. How do you experimentally find the change in wave-length by Compton? What is Compton wavelength?
10. What is Einstein's quantum Hypothesis and write down photo electric equation. Calculate the work function of sodium light in electron volt. Given that the threshold wavelength is  $6800 \text{ \AA}$  and  $h = 6.625 \times 10^{-34} \text{ JS}^{-1}$ .



## Examination Programme, 2014

(Bachelor Of Science (Part-II))

All Subjects Except B.Sc Geography & Home Science (Honours)

Date	Paper	Time	Name of Examination Centre
21/5/2014	HONOURS PAPER – III	3.30 to 6.30 pm	Nalanda Open University, Patna
23/5/2014	HONOURS PAPER – IV	3.30 to 6.30 pm	Nalanda Open University, Patna
27/5/2014	(SUB.) (Mathematics - II)	8.00 to 11.00 am	Nalanda Open University, Patna
28/5/2014	(SUB.) (Home Science- II)	<b>12.00 to 3.00 pm</b>	Nalanda Open University, Patna
29/5/2014	(SUB.) (Chemistry - II)	8.00 to 11.00 am	Nalanda Open University, Patna
30/5/2014	(SUB.) (Zoology - II)	8.00 to 11.00 am	Nalanda Open University, Patna
31/5/2014	Hindi 100 orUr 50+Hn50	<b>3.30 to 6.30 pm</b>	Nalanda Open University, Patna
02/6/2014	(SUB.) (Botany - II)	8.00 to 11.00 am	Nalanda Open University, Patna
02/6/2014	(SUB.) (Physics- II)	8.00 to 11.00 am	Nalanda Open University, Patna
04/6/2014	(SUB.) (Geography -II)	8.00 to 11.00 am	Nalanda Open University, Patna

*Programme of B.Sc. Part-II Physics (Hons.),*

*Practical Counselling Class and Examination, 2014*

Venue:- *Physics Lab, 1st Floor, Biscomaun Tower, Patna*

### **(A) Practical Counselling Class**

Date	Time
05.06.2014 to 07.06.2014	12:00 Noon to 4:00 PM

### **(B) Practical Examination**

Date	Time	Paper
10.06.2014	11:30 AM to 2:30 PM	III
	2:45 PM to 5:45 PM	IV

# Nalanda Open University

Annual Examination - 2014

B.Sc. Physics (Subsidiary), Part-II

Paper-II (Electrostatics and Magnetism, Current Electricity and Modern Physics, Optics)

Time: 3.00 Hrs.

Full Marks: 80

*Answer any Five questions. All questions carry equal marks.*

1. Using Maxwell's equation, obtain the boundary condition which the time in dependent electromagnetic field vectors  $\vec{B}$ ,  $\vec{E}$ ,  $\vec{D}$  &  $\vec{H}$  satisfy at the interface between two different media.
2. Describe Langevin's theory of paramagnetic. What are the three assumptions that Weiss made to explain the phenomena of ferromagnetism? What is Curie's law?
3. Explain Seeback effect, Pettier effect and Thomson's effect. Define Pettier Coefficient and derive its expression. What is Thomson's coefficient?
4. Obtain an expression for the growth and decay of charge in a condenser through a resistance. What is the time constant of the circuit.
5. Describe the experiment, using Thomson's apparatus, to find the specific charge of  $\frac{e}{m_e}$  electron. Deduce the necessary theory for the experiment.
6. Explain all the features of nuclear fission. What is nuclear fusion?
7. What is photo electric effect? Derive Einstein's photoelectric equation. The photo electric threshold for a certain metal is 300 nm. Determine the max<sup>m</sup> energy of the electron ejected by a radiation of  $\lambda = 200$  nm (Given that  $h = 6.6 \times 10^{-34}$  JS).
8. Explain the construction and mode of action of a diffraction grating and derive an expression for its resolving power.
9. State Brewster's Law. How will you change unpolarised light into plane polarised light by reflection? What is double refraction
10. Give an account of Bohr's theory of hydrogen atom.



**Nalanda Open University**  
**Annual Examination - 2014**  
**B.Sc. Physics (Honours), Part-III**  
**Paper-V (Mathematical Physics & Classical Mechanics)**

**Time: 3.00 Hrs.**

**Full Marks: 80**

*Answer any five questions. All questions carry equal marks.*

1. What is Dirac delta function? Gives all its properties. Also, prove that  $x\delta(x) = 0$
2. Find the solution of Laplace's equation  $\nabla^2\phi = 0$
3. State and prove Taylor's theorem.
4. State and prove Lauren's theorem.
5. State and prove the Cauchy's Residue theorem.
6. Explain tensor. Prove that the sum of two tensors is a tensor. Show that by contraction the rank of a tensor is reduced by two.
7. Establish Hamilton-Jacobi equation and solve harmonic oscillator problem by this technique.
8. Discuss the motion of symmetric top. Apply it to sleeping top.
9. Apply the method of action-angle variables to the motion of a particle in a plane under the central force.
10. Write notes on *any Two* of the following :-
  - (a) Poisson bracket
  - (b) Principle of least action
  - (c) Gyroscopic motion
  - (d) Hamilton's equation of motion



**Examination Programme-2014**  
**B.Sc (Part-III)**

**Botany, Chemistry, Mathematics, Physics and Zoology (Honours)**

Date	3.30 to 6.30 P.M.	Examination Centre
20/5/2014	Honours Paper-V	Nalanda Open University, Patna
22/5/2014	Honours Paper-VI	Nalanda Open University, Patna
24/5/2014	Honours Paper-VII	Nalanda Open University, Patna
26/5/2014	Honours Paper-VIII	Nalanda Open University, Patna
28/5/2014	Paper -XV (General Studies )	Nalanda Open University, Patna

*Programme of B.Sc. Part-III Physics (Hons.),  
 Practical Counselling Class and Examination, 2014*  
 Venue:- Physics Lab, 1st Floor, Biscomaun Tower, Patna

**(A) Practical Counselling Class**

Date	Time 12.00 Noon to 2.00 PM	Time 2.00 PM to 5.00 PM
29.05.2014	Paper-VII	Paper-VIII
30.05.2014	Paper-VII	Paper-VIII
31.05.2014	Paper-VII	Paper-VIII

**(B) Practical Examination**

Date	Time 11:30 AM to 2:30 PM	Time 2:30 PM to 5:30 PM
02.06.2014	Paper-VII	Paper-VIII

**Nalanda Open University**  
**Annual Examination - 2014**  
**B.Sc. Physics (Honours), Part-III**  
**Paper-VI (Quantum Mechanics & Statistical Mechanics)**

**Time: 3.00 Hrs.**

**Full Marks: 80**

*Answer any five questions. All questions carry equal marks.*

1. Give the Schrodinger equation, define the probability density and the probability current density. Deduce the continuity equation and show that the probability density is constant does not change with time for stationary state explain.
2. Write down and solve Schrodinger wave equation for a particle, a potential box. Use method of separation of variables find eigen values and eigen functions.
3. What is uncertainty principle? Derive Heisenberg's uncertainty relation for position and momentum variable. Show that an electron cannot exist inside the nucleus.
4. Find the transmission probability for a particle incident on a one' dimensional potential barrier height  $V_0$  and width  $a$ . Consider the two cases when :  
(a) the energy of particle  $E > V_0$  and (b)  $E < V_0$
5. Define angular momentum in quantum mechanics. Show that the components of angular momentum commute with  $L^2$ , where as they do not commute with each other.
6. State and prove Liouville's theorem.
7. Establish the Fermi-Deric distribution formula and hence obtain an expression for Fermi energy.
8. Describe Bose-Einstein Condensation. How does it differ from ordinary condensation.
9. What are symmetric and anti symmetric wave functions? Discuss, in detail, the symmetry of wave function.
10. Write notes on *any Two* of the following :-  
 (a) Grand Canonical Ensemble  
 (b) Fundamental assumptions of statistical mechanics  
 (c) Gibb's paradox  
 (d) Helmholtz free energy



**Examination Programme-2014**  
**B.Sc (Part-III)**

**Botany, Chemistry, Mathematics, Physics and Zoology (Honours)**

Date	3.30 to 6.30 P.M.	Examination Centre
20/5/2014	Honours Paper-V	Nalanda Open University, Patna
22/5/2014	Honours Paper-VI	Nalanda Open University, Patna
24/5/2014	Honours Paper-VII	Nalanda Open University, Patna
26/5/2014	Honours Paper-VIII	Nalanda Open University, Patna
28/5/2014	Paper -XV (General Studies )	Nalanda Open University, Patna

*Programme of B.Sc. Part-III Physics (Hons.),  
 Practical Counselling Class and Examination, 2014*  
 Venue:- Physics Lab, 1st Floor, Biscomaun Tower, Patna

**(A) Practical Counselling Class**

Date	Time 12.00 Noon to 2.00 PM	Time 2.00 PM to 5.00 PM
29.05.2014	Paper-VII	Paper-VIII
30.05.2014	Paper-VII	Paper-VIII
31.05.2014	Paper-VII	Paper-VIII

**(B) Practical Examination**

Date	Time 11:30 AM to 2:30 PM	Time 2:30 PM to 5:30 PM
02.06.2014	Paper-VII	Paper-VIII



# Nalanda Open University

Annual Examination - 2014

B.Sc. Physics (Honours), Part-III

Paper-VII (Classical Electrodynamics and Plasma Physics, Physics of Atoms, Molecules and Nuclei)

Time: 3.00 Hrs.

Full Marks: 80

Answer any five questions. All questions carry equal marks.

1. What do you mean by electromagnetic field tensor? Find all 16 components of this in terms of components of electric and magnetic field. What is its physical significance?
2. What is Lienard-Wiechart potential? Use these potentials to obtain electric and magnetic field intensity due to a uniformly moving charge.
3. Define a Plasma State and describe all plasma parameters. Define the concept of temperature in plasma. Explain the collective behaviour of plasma.
4. Write short notes on any **Two** of the following :-
  - (i) Debye screened potential
  - (ii) Pinch effect
  - (iii) Covariance of Maxwell's equations under Lorentz transformation
5. What is Zeeman effect? Distinguish between normal and anomalous Zeeman effect. How do you observe normal Zeeman effect.
6. Discuss the vibrational spectra of a diatomic molecule treated as a Harmonic Vibrator. Give necessary diagrams. Give the short coming of this model?
7. Explain the working and principle of (a) He-Ne gas laser and (b) Optically pumped laser.
8. What do you mean by NMR Spectroscopy? Describe, with diagram, the continuous wave NMR spectrometer.
9. Discuss the angular momentum, magnetic moment and electric quadruple moment associated with an atomic nucleus. What is the importance of these properties of a nucleus?
10. Explain the shell model of nucleus. How is this model used to explain the angular momentum of ground state of nucleus?



## Examination Programme-2014

B.Sc (Part-III)

Botany, Chemistry, Mathematics, Physics and Zoology (Honours)

Date	3.30 to 6.30 P.M.	Examination Centre
20/5/2014	Honours Paper-V	Nalanda Open University, Patna
22/5/2014	Honours Paper-VI	Nalanda Open University, Patna
24/5/2014	Honours Paper-VII	Nalanda Open University, Patna
26/5/2014	Honours Paper-VIII	Nalanda Open University, Patna
28/5/2014	Paper -XV (General Studies )	Nalanda Open University, Patna

Programme of B.Sc. Part-III Physics (Hons.),  
Practical Counselling Class and Examination, 2014  
Venue:- Physics Lab, 1st Floor, Biscomaun Tower, Patna

### (A) Practical Counselling Class

Date	Time 12.00 Noon to 2.00 PM	Time 2.00 PM to 5.00 PM
29.05.2014	Paper-VII	Paper-VIII
30.05.2014	Paper-VII	Paper-VIII
31.05.2014	Paper-VII	Paper-VIII

### (B) Practical Examination

Date	Time 11:30 AM to 2:30 PM	Time 2:30 PM to 5:30 PM
02.06.2014	Paper-VII	Paper-VIII

**Nalanda Open University**  
**Annual Examination - 2014**  
**B.Sc. Physics (Honours), Part-III**  
**Paper-VIII (Condensed Matter Physics & Electronics)**

**Time: 3.00 Hrs.**

**Full Marks: 80**

*Answer any five questions. All questions carry equal marks.*

1. Discuss Van-der-Waals binding. Obtain the expression for the total potential energy of a Crystal of Natons on the basis of this theory.
2. What is space lattice? Mention and explain various types of lattices in cubic system. Show that for a simple cubic lattice :  $\rightarrow d_{100} : d_{110} : d_{111} = \sqrt{6} : \sqrt{3} : \sqrt{2}$ .
3. State and explain Hall effect. Describe Hall coefficients and give its importance. How can you determine them?
4. Explain Drude-Lorentz theory. Derive Wiedemann-Franz relation on the basis of this.
5. What do you mean by energy band? Distinguish clearly between a metal, a semiconductor and an insulator on the basis of energy bands in solids.
6. State and explain 'Thevenin's theorem' and 'Norton's theorem'. How are these theorems used in circuit analysis? Give at least one example.
7. What are *p*-type and *n*-type semiconductors? How is a *p-n* junction formed? Discuss how a potential barrier develops at the junction.
8. What is photodiode? Discuss the working, characteristics and uses of photodiode.
9. Give the complete description of each of the logic gates :  
 AND, OR, NAND, NOR, OR & XOR.  
 Explain why NAND and NOR gates are called Universal gates.
10. What is filter circuit? How are they classified? Describe the elementary filter theory. State and explain Reciprocity theorem.



**Examination Programme-2014**  
**B.Sc (Part-III)**

**Botany, Chemistry, Mathematics, Physics and Zoology (Honours)**

Date	3.30 to 6.30 P.M.	Examination Centre
20/5/2014	Honours Paper-V	Nalanda Open University, Patna
22/5/2014	Honours Paper-VI	Nalanda Open University, Patna
24/5/2014	Honours Paper-VII	Nalanda Open University, Patna
26/5/2014	Honours Paper-VIII	Nalanda Open University, Patna
28/5/2014	Paper -XV (General Studies )	Nalanda Open University, Patna

*Programme of B.Sc. Part-III Physics (Hons.),  
 Practical Counselling Class and Examination, 2014*  
 Venue:- Physics Lab, 1st Floor, Biscomaun Tower, Patna

**(A) Practical Counselling Class**

Date	Time 12.00 Noon to 2.00 PM	Time 2.00 PM to 5.00 PM
29.05.2014	Paper-VII	Paper-VIII
30.05.2014	Paper-VII	Paper-VIII
31.05.2014	Paper-VII	Paper-VIII

**(B) Practical Examination**

Date	Time 11:30 AM to 2:30 PM	Time 2:30 PM to 5:30 PM
02.06.2014	Paper-VII	Paper-VIII