

# NALANDA OPEN UNIVERSITY

## M.Sc. Physics, Part-I

### PAPER-I

(Mathematical Physics)

Annual Examination, 2019

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.  
All questions carry equal marks.

- Show that,  
(a)  $\vec{A} \times (\vec{B} \times \vec{C}) = (\vec{A} \cdot \vec{C}) \vec{B} - (\vec{A} \cdot \vec{B}) \vec{C}$   
(b)  $(\vec{A} \times \vec{B}) \times \vec{C} = (\vec{A} \cdot \vec{C}) \vec{B} - (\vec{B} \cdot \vec{C}) \vec{A}$
- Find the equation of motion for a charged particle in an electromagnetic field using the Hamiltonian of the particle.
- Show that, (a) row-equivalent matrices have the same rank, (b) the row-space and the column-space of a matrix have the same dimension equal to rank A.
- Prove that Poisson's brackets remain invariant with respect to canonical transformation.
- Write notes on orthonormality of column and row vectors. Prove that eigenvectors of a symmetric matrix corresponding to different eigenvalues are orthogonal.
- Starting with the series expansion, derive Rodrigues formula for Legendre polynomials.
- Derive integral representation of  $J_n(x)$ , the Bessel's function of first kind of order n.
- State and explain clearly Fourier transform and the convolution theorem.
- If  $\phi$  is an invariant, determine whether  $\frac{\partial^2 \phi}{\partial x^p \partial x^q}$  is a tensor.
- Find the Laplace transform for (a)  $3t^4 - 2t^3 + 4e^{-3t} - 2\sin 5t + 3 \cos 2t$ .

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### Examination Programme, 2019

#### M.Sc. Physics, Part-I

Date	Papers	Time	Examination Centre
13.07.2019	Paper-I	3.30 PM to 6.30 PM	Nalanda Open University, Patna
16.07.2019	Paper-II	3.30 PM to 6.30 PM	Nalanda Open University, Patna
18.07.2019	Paper-III	3.30 PM to 6.30 PM	Nalanda Open University, Patna
20.07.2019	Paper-IV	3.30 PM to 6.30 PM	Nalanda Open University, Patna
22.07.2019	Paper-V	3.30 PM to 6.30 PM	Nalanda Open University, Patna
24.07.2019	Paper-VI	3.30 PM to 6.30 PM	Nalanda Open University, Patna
26.07.2019	Paper-VII	3.30 PM to 6.30 PM	Nalanda Open University, Patna
30.07.2019	Paper-VIII	3.30 PM to 6.30 PM	Nalanda Open University, Patna

# NALANDA OPEN UNIVERSITY

## M.Sc. Physics, Part-I

### PAPER-II

(Quantum Mechanics)

Annual Examination, 2019

Time : 3 Hours.

Full Marks : 80

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

1. What is a Wave packet ? Obtain expressions for the group velocity and the phase velocity of a de-Broglie wave. Show that the product of the phase velocity and the group velocity is equal to  $c^2$ .
2. Calculate the reflection and the refraction coefficients when a charged particle is incident from the left with energy  $E > 0$ , on a square well potential given by :
$$V(x) = -V_0, \quad 0 < x < a$$
$$= 0, \quad x < 0 \text{ and } x > a$$
3. Show that (a)  $[L_z, L_+] = \hbar L_+$ , (b)  $[L_z, L_-] = \hbar L_-$ , and (c)  $L^2, L_z = 0$  Where  $L^2$  &  $L_z$  have their usual meaning.
4. State Heisenberg uncertainty principle, obtain momentum-position uncertainty relation and hence find (a)  $\Delta \phi \cdot \Delta l \geq \frac{\hbar}{2}$  and (b)  $\Delta E \cdot \Delta t \geq \frac{\hbar}{2}$ .
5. Set up Schrödinger equation for an one-dimensional harmonic oscillator and solve it to obtain its energy eigenvalues and eigenfunctions.
6. Discuss the scattering of particles by a spherically symmetric potential. Explain partial waves and phase shift.
7. State and explain Fermi golden rule. What do you understand by adiabatic and sudden approximation ?
8. Describe time independent perturbation theory to get a good approximation to the non-degenerate energy eigenvalues.
9. What are identical particles ? Give the significance of identical particles in quantum mechanics. Discuss symmetrization procedure for bosons and fermions.
10. Write short notes on any **Two** of the following :—
  - (a) Dual nature of de-Broglie wave.
  - (b) Dirac delta function.
  - (c) Operators in quantum mechanics.
  - (d) Bra & Ket notations.

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**NALANDA OPEN UNIVERSITY**

**M.Sc. Physics, Part-I**

**PAPER—III**

(Electrodynamics and Plasma Physics)

*Annual Examination, 2019*

**Time : 3 Hours.**

**Full Marks : 80**

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

1. Show that D' Alembertian operator  $\square^2$  is invariant under Lorentz transformation.
2. Establish electromagnetic field tensor.
3. Explain advanced and retarded potential. Obtain an expression for angular distribution of power for uniformly moving point charge.
4. Deduce Larmor's formula for a non-relativistic accelerated charge.
5. Discuss the motion of a charged particle in oscillating electromagnetic fields.
6. What is Plasma ? Give the key difference between plasma and normal gas. Derive an expression for Debye length.
7. Explain Saha's theory of thermal ionization to determine the plasma ionization.
8. Derive the zeroth, first and second moments of Boltzmann's equation.
9. Derive an expression for plasma frequency from the mass conservation equation of continuity.
10. Obtain an expression for the Alfvén Speed. Explain the nature of Alfvén Wave and the requisite condition for its formation.

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NALANDA OPEN UNIVERSITY

M.Sc. Physics, Part-I

PAPER-IV

(Statistical Mechanics)

Annual Examination, 2019

Time : 3 Hours.

Full Marks : 80

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

1. State and prove Liouville theorem. How is it analogous to the equation of continuity of an incompressible fluid ?
2. State and prove Boltzmann theorem of entropy. Obtain expression for the entropy of a monoatomic gas.
3. What is phase transition ? Differentiate between the first order and the second order phase transitions. Discuss the Landau theory of phase transition.
4. Explain microcanonical and grand canonical ensembles. Derive Sackur-Tetrode equation for a perfect gas.
5. Derive Fermi-Dirac distribution law.
6. Derive the Virial equation of state and evaluate the Virial coefficients.
7. What are critical indices ? Explain the different scaling relations and the critical indices.
8. What do you mean by partition function ? Show that the partition function of a monoatomic gas is given by  $Z = \frac{V}{h^3} (2\pi m k T)^{3/2}$ .
9. Describe two dimensional *Ising* model and show how does it explain the phenomenon of spontaneous magnetization.
10. Write notes on any **Two** of the following :—
  - (a) Gibbs' paradox.
  - (b) Bose-Einstein Condensation.
  - (c) Assumptions of statistical mechanics.
  - (d) Phase-space and density of states.

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# NALANDA OPEN UNIVERSITY

## M.Sc. Physics, Part-I

### PAPER-V

(Nuclear and Particle Physics)

*Annual Examination, 2019*

**Time : 3 Hours.**

**Full Marks : 80**

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

1. Account for the nature of force existing between a proton and a neutron in a deuteron in the ground state.
2. Derive an expression for the partial wave expansion of a plane wave.
3. What are electric and magnetic transitions in Gamma-ray emission ? Explain multipolarity in Gamma-transition.
4. Explain 'scattering length' and 'effective range'. Find a relation between these quantities on the basis of effective range theory of neutron proton scattering.
5. Describe the basic ideas of Yukawa's meson exchange theory of the nuclear forces. Give the properties of  $\pi$ -meson.
6. Write a detailed note on the classification of elementary particles.
7. Describe the compound nucleus theory of nuclear reactions. Give experimental evidences in support of this theory.
8. Give a brief account of Fermi's theory of  $\beta$ -decay and show how it was necessary to postulate the existence of neutrino.
9. Give the simple Breit-Winger one level formula for the cross-section of neutron reaction in nuclei. Explain how the width of the resonance level can be obtained from this formula.
10. Describe Wu's experiment and give its interpretation to explain the non-conservation of parity in weak interaction.

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M.Sc. Physics, Part-I, Practical Counselling Classes and Practical Examination, 2019

Venue : Physics Lab, 1<sup>st</sup> Floor, Biscomaun Tower, Patna

***For Enrollment No. All Old Batch Students***

<b><i>Counselling Class Programme</i></b>		<b><i>Practical Examination Programme</i></b>		
<b><i>Date</i></b>	<b><i>Time</i></b>	<b><i>Paper</i></b>	<b><i>Date</i></b>	<b><i>Time</i></b>
01.08.2019 & 02.08.2019	10.00 AM to 2.30 PM	VI	03.08.2019	9:00 AM to 12:00 Noon
		VII	03.08.2019	12:15 PM to 3:15 PM
		VIII	03.08.2019	3:30 PM to 6:30 PM

***For Enrollment No. 180280001 to 180280070***

<b><i>Counselling Class Programme</i></b>		<b><i>Practical Examination Programme</i></b>		
<b><i>Date</i></b>	<b><i>Time</i></b>	<b><i>Paper</i></b>	<b><i>Date</i></b>	<b><i>Time</i></b>
01.08.2019 & 02.08.2019	2.30 PM to 6.30 PM	VI	05.08.2019	9:00 AM to 12:00 Noon
		VII	05.08.2019	12:15 PM to 3:15 PM
		VIII	05.08.2019	3:30 PM to 6:30 PM

***For Enrollment No. 180280071 to 180280140***

<b><i>Counselling Class Programme</i></b>		<b><i>Practical Examination Programme</i></b>		
<b><i>Date</i></b>	<b><i>Time</i></b>	<b><i>Paper</i></b>	<b><i>Date</i></b>	<b><i>Time</i></b>
06.08.2019 & 07.08.2019	10.00 AM to 2.30 PM	VI	08.08.2019	9:00 AM to 12:00 Noon
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		VIII	08.08.2019	3:30 PM to 6:30 PM

***For Enrollment No. 180280141 to 180280220***

<b><i>Counselling Class Programme</i></b>		<b><i>Practical Examination Programme</i></b>		
<b><i>Date</i></b>	<b><i>Time</i></b>	<b><i>Paper</i></b>	<b><i>Date</i></b>	<b><i>Time</i></b>
06.08.2019 & 07.08.2019	2.30 PM to 6.30 PM	VI	09.08.2019	9:00 AM to 12:00 Noon
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		VIII	09.08.2019	3:30 PM to 6:30 PM

***For Enrollment No. 180280221 to 180280320***

<b><i>Counselling Class Programme</i></b>		<b><i>Practical Examination Programme</i></b>		
<b><i>Date</i></b>	<b><i>Time</i></b>	<b><i>Paper</i></b>	<b><i>Date</i></b>	<b><i>Time</i></b>
10.08.2019 & 13.08.2019	10.00 AM to 2.30 PM	VI	14.08.2019	9:00 AM to 12:00 Noon
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		VIII	14.08.2019	3:30 PM to 6:30 PM

***For Enrollment No. 180280321 to 180280450***

<b><i>Counselling Class Programme</i></b>		<b><i>Practical Examination Programme</i></b>		
<b><i>Date</i></b>	<b><i>Time</i></b>	<b><i>Paper</i></b>	<b><i>Date</i></b>	<b><i>Time</i></b>
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		VIII	16.08.2019	3:30 PM to 6:30 PM

# NALANDA OPEN UNIVERSITY

## M.Sc. Physics, Part-I

### PAPER-VI

(Atomic and molecular Physics)

Annual Examination, 2019

Time : 3 Hours.

Full Marks : 80

Answer Five Questions in all, selecting at least Two Questions from each group.  
All questions carry equal marks.

#### GROUP 'A'

1. State and explain Pauli's exclusion principle and discuss how this principle is connected with the symmetry of the wave function.
2. Explain the phenomena of anomalous Zeeman and Paschen-Back effects, give their theoretical explanations separately.
3. Discuss the hyperfine structure of spectral lines. What light does this throw on the spin and magnetic moment of atomic nuclei ?
4. Write down the Schrödinger equation of one electron atom and solve it by the method of separation of variables. Explain the physical meaning of all the quantum numbers that appear.
5. Discuss briefly the various factors which contribute to the broadening of spectral line.

#### GROUP 'B'

6. What is Raman effect ? Explain theoretically the observed characteristic of the Raman Spectrum of the diatomic molecules.
7. Discuss the principal features of the electronic spectrum.
8. What do you mean by ESR ? Explain the basic principles of interaction of electrons spin and applied magnetic field.
9. Describe the principal feature of the rotational bond spectrum of a diatomic molecule. Estimate the energy difference between the rotational levels  $J = 0$  and  $J = 1$  of HCl molecule. Its M.I. is  $2.66 \times 10^{-47}$  kg.m<sup>2</sup>.
10. Write notes on any **Two** of the following :—
  - (a) Franc-Condon Principle.
  - (b) LS and JJ Coupling.
  - (c) Origin of P, Q and R branches in Vibration-Rotation-Spectra.
  - (d) NMR spectroscopy.

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M.Sc. Physics, Part-I, Practical Counselling Classes and Practical Examination, 2019  
Venue : Physics Lab, 1<sup>st</sup> Floor, Biscomaun Tower, Patna

#### For Enrollment No. All Old Batch Students

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Date	Time	Paper	Date	Time
01.08.2019 & 02.08.2019	10.00 AM to 2.30 PM	VI	03.08.2019	9:00 AM to 12:00 Noon
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#### For Enrollment No. 180280001 to 180280070

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
01.08.2019 & 02.08.2019	2.30 PM to 6.30 PM	VI	05.08.2019	9:00 AM to 12:00 Noon
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		VIII	05.08.2019	3:30 PM to 6:30 PM

#### For Enrollment No. 180280071 to 180280140

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
06.08.2019 & 07.08.2019	10.00 AM to 2.30 PM	VI	08.08.2019	9:00 AM to 12:00 Noon
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#### For Enrollment No. 180280141 to 180280220

Counselling Class Programme		Practical Examination Programme		
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06.08.2019 & 07.08.2019	2.30 PM to 6.30 PM	VI	09.08.2019	9:00 AM to 12:00 Noon
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#### For Enrollment No. 180280221 to 180280320

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
10.08.2019 & 13.08.2019	10.00 AM to 2.30 PM	VI	14.08.2019	9:00 AM to 12:00 Noon
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#### For Enrollment No. 180280321 to 180280450

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
10.08.2019 & 13.08.2019	2.30 PM to 6.30 PM	VI	16.08.2019	9:00 AM to 12:00 Noon
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# NALANDA OPEN UNIVERSITY

## M.Sc. Physics, Part-I

### PAPER-VII

(Condensed Matter Physics)

*Annual Examination, 2019*

**Time : 3 Hours.**

**Full Marks : 80**

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

1. Derive Laue equations for diffraction of X-rays by a crystalline solid. Show that the Bragg's equation in a special case of the Laue equations.
2. In study of crystal structures, define the following terms :—  
(a) Crystalline, Polycrystalline and Amorphous states of solids.  
(b) Lattice, basis and crystal structure.
3. Discuss the quantization of electron orbits in a magnetic field.
4. What is quantum hall effect ? Give an account of the theory of this effect.
5. What is a superconductor ? Explain how their properties differ from those of normal conductors.
6. What is Fermi Surface ? What are its main characteristics ? Discuss the effect of electric field and magnetic field on Fermi Surface.
7. Explain Schottky and Frankel defects. Calculate the equilibrium concentration of each of the defects and indicate the order of their magnitude.
8. Give the qualitative description of the BCS theory. How does it account for the superconductivity state ?
9. Describe cellular method for studying the band structure of the solids. What are the problems encountered in this method.
10. State and prove Bloch theorem. Explain the significance of the effective mass of the electron.

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M.Sc. Physics, Part-I, Practical Counselling Classes and Practical Examination, 2019  
Venue : Physics Lab, 1<sup>st</sup> Floor, Biscomaun Tower, Patna

***For Enrollment No. All Old Batch Students***

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***For Enrollment No. 180280001 to 180280070***

<b><i>Counselling Class Programme</i></b>		<b><i>Practical Examination Programme</i></b>		
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***For Enrollment No. 180280071 to 180280140***

<b><i>Counselling Class Programme</i></b>		<b><i>Practical Examination Programme</i></b>		
<b><i>Date</i></b>	<b><i>Time</i></b>	<b><i>Paper</i></b>	<b><i>Date</i></b>	<b><i>Time</i></b>
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		VIII	08.08.2019	3:30 PM to 6:30 PM

***For Enrollment No. 180280141 to 180280220***

<b><i>Counselling Class Programme</i></b>		<b><i>Practical Examination Programme</i></b>		
<b><i>Date</i></b>	<b><i>Time</i></b>	<b><i>Paper</i></b>	<b><i>Date</i></b>	<b><i>Time</i></b>
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***For Enrollment No. 180280221 to 180280320***

<b><i>Counselling Class Programme</i></b>		<b><i>Practical Examination Programme</i></b>		
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		VIII	14.08.2019	3:30 PM to 6:30 PM

***For Enrollment No. 180280321 to 180280450***

<b><i>Counselling Class Programme</i></b>		<b><i>Practical Examination Programme</i></b>		
<b><i>Date</i></b>	<b><i>Time</i></b>	<b><i>Paper</i></b>	<b><i>Date</i></b>	<b><i>Time</i></b>
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# NALANDA OPEN UNIVERSITY

## M.Sc. Physics, Part-I

### PAPER–VIII

(Electronic Devices)

Annual Examination, 2019

**Time : 3 Hours.**

**Full Marks : 80**

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

1. Describe the mechanism of current flow in a properly biased BJT. Define the various parameters of BJT.
2. Describe the design and operating characteristics of tunnel diode. What is meant by tunneling ?
3. Explain transmissive and reflective type LCDs.
4. Describe the design of MOSFET and obtain an expression for drain current.
5. How can NMOS device be used to implement memory device ? Explain it.
6. What are Lyotropic Liquid Crystals ? Discuss generic progression of phases going from low to high amphiphile concentration.
7. State and explain (i) Electrostrictive effect and (ii) Magnetostrictive effect.
8. Give an account of the theoretical treatment of liquid crystals.
9. What are ferromagnetic materials ? Discuss their classification. Give the important properties of these materials.
10. (a) Explain acousto optic effect. Mention the areas of its applications.  
(b) What are mesogens ? Give examples of mesogenic structures.

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M.Sc. Physics, Part-I, Practical Counselling Classes and Practical Examination, 2019  
Venue : Physics Lab, 1<sup>st</sup> Floor, Biscomaun Tower, Patna

**For Enrollment No. All Old Batch Students**

Counselling Class Programme		Practical Examination Programme		
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**For Enrollment No. 180280001 to 180280070**

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
01.08.2019 & 02.08.2019	2.30 PM to 6.30 PM	VI	05.08.2019	9:00 AM to 12:00 Noon
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**For Enrollment No. 180280071 to 180280140**

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
06.08.2019 & 07.08.2019	10.00 AM to 2.30 PM	VI	08.08.2019	9:00 AM to 12:00 Noon
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		VIII	08.08.2019	3:30 PM to 6:30 PM

**For Enrollment No. 180280141 to 180280220**

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
06.08.2019 & 07.08.2019	2.30 PM to 6.30 PM	VI	09.08.2019	9:00 AM to 12:00 Noon
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		VIII	09.08.2019	3:30 PM to 6:30 PM

**For Enrollment No. 180280221 to 180280320**

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
10.08.2019 & 13.08.2019	10.00 AM to 2.30 PM	VI	14.08.2019	9:00 AM to 12:00 Noon
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**For Enrollment No. 180280321 to 180280450**

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# NALANDA OPEN UNIVERSITY

## M.Sc. Physics, Part-II

### PAPER-IX

(Computational Mathematics)

Annual Examination, 2019

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.  
All questions carry equal marks.

- Using Newton-Raphson formula, find a root of the equation  $x \sin x + \cos x = 0$ .
- Explain Monte-Carlo Method. Describe various areas where this method is applied. Explain Monte-Carlo Simulation and Monte-Carlo Integration.
- What do you understand by eigenvalues and eigenvectors of a matrix ? Let  $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$  be a matrix. Find its eigenvalues and eigenvectors.
- Using the matrix inversion method, find the solution of the following set of algebraic equation  $3x + y + 2z = 3$ ,  $2x - 3y - z = -3$  and  $x + 2y + z = 4$ .
- Find by Gauss's formula  $I = \int_a^b x dx$  in terms of abscissa and weights of Gaussian integration.
- Use Runge-Kutta method to solve the differential equation  $10 \frac{dy}{dx} = x^2 + y^2$  with  $y(0) = 1$  for the interval  $0 < x \leq 0.4$  with  $h = 0.1$ .
- Use the finite difference formula for solving Poisson's equation, solve the following Poisson's Equation  $\nabla^2 f = 2x^2y^2$ , over the square  $0 \leq x \leq 3$  and  $0 \leq y \leq 3$  with  $f = 0$  on the boundary and  $h = 1$ .
- Describe the 'Crank-Nicholson Method' to solve the parabolic differential equation. Give a suitable example.
- Explain the use of the 'Cubic Spline Method' in numerical differentiation with illustrative examples.
- Obtain the values of  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  for  $x = 1.2$  using the table :—

<b>x</b>	1.0	1.2	1.4	1.6	1.8	2.0	2.2
<b>y</b>	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

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Examination Programme, 2019

M.Sc. Physics, Part-II

Date	Paper	Time	Examination Centre
06.08.2019	Paper-IX	8.00 AM to 11.00 AM	Nalanda Open University, Patna
08.08.2019	Paper-X	8.00 AM to 11.00 AM	Nalanda Open University, Patna
10.08.2019	Paper-XI	8.00 AM to 11.00 AM	Nalanda Open University, Patna
12.08.2019	Paper-XII	8.00 AM to 11.00 AM	Nalanda Open University, Patna
14.08.2019	Paper-XIII	8.00 AM to 11.00 AM	Nalanda Open University, Patna
16.08.2019	Paper-XIV	8.00 AM to 11.00 AM	Nalanda Open University, Patna
20.08.2019	Paper-XV	8.00 AM to 11.00 AM	Nalanda Open University, Patna
22.08.2019	Paper-XVI	8.00 AM to 11.00 AM	Nalanda Open University, Patna

# NALANDA OPEN UNIVERSITY

## M.Sc. Physics, Part-II

### PAPER-X

(Programming with Fortran and C++)

*Annual Examination, 2019*

**Time : 3 Hours.**

**Full Marks : 80**

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

1. What is a Computer Programme ? Explain the terms : Machine Language, Compiler, Interpreter and Assembler. What is the difference between a hardware and a software ?
2. Write a FUNCTION subprogram which calculates the sum of the elements in a linear array with N elements.
3. Explain integer and real data types representation in the Fortran Language with examples.
4. What are special operators used in the C++ language to perform particular type of operation ? Discuss all such operators in detail.
5. Discuss the characteristics of OPEN, READ, END FILE and CLOSE FILE statement used in file format of Fortran.
6. Write a programme in C++ to perform the work of finding (i) the area of a triangle, (ii) the circumference of a circle.
7. What is the relationship between a pointer and an array ? Explain how a pointer to function can be declared in C++.
8. Summarize the syntactic rules of the following loop statements :-  
(i) While loop,  
(ii) DO-while loop
9. What is meant by conditional compilation ?
10. What is multidimensional array and how is it different from a one dimensional array ?

\* \* \*

### M.Sc. Physics, Part-II

#### Practical Counseling and Practical Examination Programme, 2019

**For Enrollment No. 140280001 to 140280250, 150280001 to 150280450 & 160280001 to 160280650**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
24.08.2019 & 25.08.2019	11.00 AM to 5.00 PM	XII	26.08.2019	11:30 AM to 2:30 PM
		XIV	26.08.2019	2:45 PM to 5:45 PM
		XV	27.08.2019	11:30 AM to 2:30 PM
		XVI	27.08.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

#### Practical Programme for Paper-X of All Students

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
28.08.2019 to 31.08.2019	12.00 Noon to 4.00 PM	X	02.09.2019	12:00 Noon to 3:00 PM
Venue : School of Computer Education & IT, Nalanda Open University, 12 <sup>th</sup> Floor, Biscomaun Tower, Patna-800001				

#### For Enrollment No. 170280001 to 170280300

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
03.09.2019 & 04.09.2019	11.00 AM to 5.00 PM	XII	05.09.2019	11:30 AM to 2:30 PM
		XIV	05.09.2019	2:45 PM to 5:45 PM
		XV	06.09.2019	11:30 AM to 2:30 PM
		XVI	06.09.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

#### For Enrollment No. 170280301 to 170280750

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
07.09.2019 & 09.09.2019	11.00 AM to 5.00 PM	XII	11.09.2019	11:30 AM to 2:30 PM
		XIV	11.09.2019	2:45 PM to 5:45 PM
		XV	12.09.2019	11:30 AM to 2:30 PM
		XVI	12.09.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

# NALANDA OPEN UNIVERSITY

## M.Sc. Physics, Part-II

### PAPER–XI

(Physics of Nano Materials)

Annual Examination, 2019

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions. All questions carry equal marks.

- Using the collision-time concept, derive an expression for the electrical conductivity of a free electron gas. Does this result explain the experimental value of resistivity of a metal ?
- Explain the band formation in the hydrogen molecule. What do you understand by energy bands in Crystal ?
- Classify crystalline solids into metals, semiconductors and insulators on the basis band theory. Explain the concept of effective mass of charge carriers.
- Obtain the eigenvalues and normalized eigenfunctions of a particle in one dimensional infinite potential box of side 'a'.
- What is a quantum wire ? Describe the various methods for its fabrication.
- What is a quantum dot ? Discuss the structure and characteristics of different kinds of quantum dots.
- What is Raman effect ? Discuss the variations in Raman Spectra of nanomaterials.
- Describe the citrate precursor technique for preparation of nanoparticles.
- Describe the Hartree-Fock Approximation of the coulomb interaction between 3D confined electrons. Mention the application of Hund's rule in quantum dots.
- What do you mean by Multiferric Magnetolectric materials ? Describe the application of such materials.

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### M.Sc. Physics, Part-II

#### Practical Counseling and Practical Examination Programme, 2019

For Enrollment No. 140280001 to 140280250, 150280001 to 150280450 & 160280001 to 160280650

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
24.08.2019 & 25.08.2019	11.00 AM to 5.00 PM	XII	26.08.2019	11:30 AM to 2:30 PM
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		XVI	27.08.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

#### Practical Programme for Paper-X of All Students

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
28.08.2019 to 31.08.2019	12.00 Noon to 4.00 PM	X	02.09.2019	12:00 Noon to 3:00 PM
Venue : School of Computer Education & IT, Nalanda Open University, 12 <sup>th</sup> Floor, Biscomaun Tower, Patna-800001				

#### For Enrollment No. 170280001 to 170280300

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
03.09.2019 & 04.09.2019	11.00 AM to 5.00 PM	XII	05.09.2019	11:30 AM to 2:30 PM
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		XV	06.09.2019	11:30 AM to 2:30 PM
		XVI	06.09.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

#### For Enrollment No. 170280301 to 170280750

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
07.09.2019 & 09.09.2019	11.00 AM to 5.00 PM	XII	11.09.2019	11:30 AM to 2:30 PM
		XIV	11.09.2019	2:45 PM to 5:45 PM
		XV	12.09.2019	11:30 AM to 2:30 PM
		XVI	12.09.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

**NALANDA OPEN UNIVERSITY**  
**M.Sc. Physics, Part-II**  
**PAPER–XII**  
 (Science and Technology of Renewable Energy)  
*Annual Examination, 2019*

**Time : 3 Hours.**

**Full Marks : 80**

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

1. What is meant by air mass and how is it related to standardized solar spectrum ? What are major atmospheric effects limiting the performance of photovoltaic applications ?
2. Explain 'Green House Effect' and the co-relation of the rise of atmospheric carbon dioxide concentration with the rise in average temperature.
3. Discuss the efficiency of a solar cell and explain the importance of Fill Factor in a solar cell.
4. State and explain drift velocity. Derive expression for conductivity and mobility.
5. Derive expression for total current in (a) Wide-Base Diode and (b) Narrow-Base Diode.
6. Explain the perspectives of hydrogen energy in the World. Give an account of the pilot programmes. What are safety risks involved with the applications of hydrogen fuel ?
7. (a) What is Geothermal Power ? Discuss its advantages and disadvantages.  
 (b) Give the methods of harnessing (i) Wave energy and (ii) Tidal energy.
8. Explain surface texturing and light trapping mechanism for a Silicon Solar Cell. What is a Lambertian Rear Reflector ?
9. What do you understand by band gap ? Describe the formation of intrinsic carriers and their concentration variation with temperature.
10. Explain capacity factor of wind farms. How does it help in increasing the reliability of wind farms.

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**M.Sc. Physics, Part-II**  
**Practical Counseling and Practical Examination Programme, 2019**

**For Enrollment No. 140280001 to 140280250, 150280001 to 150280450 & 160280001 to 160280650**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
24.08.2019 & 25.08.2019	11.00 AM to 5.00 PM	XII	26.08.2019	11:30 AM to 2:30 PM
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		XVI	27.08.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

**Practical Programme for Paper-X of All Students**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
28.08.2019 to 31.08.2019	12.00 Noon to 4.00 PM	X	02.09.2019	12:00 Noon to 3:00 PM
Venue : School of Computer Education & IT, Nalanda Open University, 12 <sup>th</sup> Floor, Biscomaun Tower, Patna-800001				

**For Enrollment No. 170280001 to 170280300**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
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		XVI	06.09.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

**For Enrollment No. 170280301 to 170280750**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
07.09.2019 & 09.09.2019	11.00 AM to 5.00 PM	XII	11.09.2019	11:30 AM to 2:30 PM
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		XVI	12.09.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

**NALANDA OPEN UNIVERSITY**  
**M.Sc. Physics, Part-II**  
**PAPER–XIII**  
 (Environmental Physics)  
 Annual Examination, 2019

**Time : 3 Hours.**

**Full Marks : 80**

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

1. What do you mean by contact temperature ? Obtain an expression for it.
2. What do you mean by Baroclinic models ? What is Reynolds number  $Re$  ?
3. What are the elements of weather and climate ? What is common between General Circulation Model (GCM) and Numerical Weather Production (NWP) model ?
4. What do you mean by renewable energy ? Describe the various types of renewable energy. Point out the economic importance of the renewable energy.
5. Explain Raman, Rayleigh and Mie scatterings. Distinguish between Raman and Mie scattering. Explain Resonance Raman scattering.
6. Discuss the diffusion of guest particles in a medium.
7. Discuss the working principle of Gratzed Cell. Give the properties of these cell.
8. Discuss the power from nuclear fission and nuclear fusion. How will you optimize the reactor size based on fission ?
9. What is Urban Heat Island ? Explain the causes of Heat Island.
10. 'Bio-fuels are renewable energy sources', why ? Explain, in brief, the four generations of bio-fuels.

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**M.Sc. Physics, Part-II**  
**Practical Counseling and Practical Examination Programme, 2019**

**For Enrollment No. 140280001 to 140280250, 150280001 to 150280450 & 160280001 to 160280650**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
24.08.2019 & 25.08.2019	11.00 AM to 5.00 PM	XII	26.08.2019	11:30 AM to 2:30 PM
		XIV	26.08.2019	2:45 PM to 5:45 PM
		XV	27.08.2019	11:30 AM to 2:30 PM
		XVI	27.08.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscamaun Tower, Patna-800001				

**Practical Programme for Paper-X of All Students**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
28.08.2019 to 31.08.2019	12.00 Noon to 4.00 PM	X	02.09.2019	12:00 Noon to 3:00 PM
Venue : School of Computer Education & IT, Nalanda Open University, 12 <sup>th</sup> Floor, Biscamaun Tower, Patna-800001				

**For Enrollment No. 170280001 to 170280300**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
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		XVI	06.09.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscamaun Tower, Patna-800001				

**For Enrollment No. 170280301 to 170280750**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
07.09.2019 & 09.09.2019	11.00 AM to 5.00 PM	XII	11.09.2019	11:30 AM to 2:30 PM
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		XV	12.09.2019	11:30 AM to 2:30 PM
		XVI	12.09.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscamaun Tower, Patna-800001				

**NALANDA OPEN UNIVERSITY**  
**M.Sc. Physics, Part-II**  
**PAPER–XIV**  
 (Photonics)  
**Annual Examination, 2019**

**Time : 3 Hours.**

**Full Marks : 80**

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

1. Describe band gap and fill factor of a p-n cell. How does fill factor depend on the normalized open circuit voltage ?
2. What do you mean by photonics ? How is it different from electronics ? Comment on the future of this branch of physics.
3. Describe a Light Emitting Diode (LED). What do you mean by injected holes and electrons ?
4. Describe an injection laser. What is double heterojunction injection laser ? Explain the term injection.
5. What is mode locking operation in laser ? Prove that the output of mode locked laser is  $n$  times the power of the same laser with modes uncoupled. Describe a technique developed for achieving mode locking. What is passive mode locking ?
6. What do you mean by beats ? Explain the concept of beats from acoustic to optical region.
7. Obtain a relation between divergence and waist size of the beam for a Gaussian distribution of wave energy.
8. Explain the difference between analog and digital communication. Why digital communication is more suitable with modern day requirement ?
9. Obtain expressions for the following terms related to an optical fibre : (i) Critical angle, (ii) Numerical aperture, (iii) Acceptance angle, (iv) Relative refractive index difference.
10. Starting from the Maxwell's field equations, derive the wave equations for  $E_z$  and  $H_z$  components for an e.m. wave travelling along positive z-direction.

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**M.Sc. Physics, Part-II**  
**Practical Counseling and Practical Examination Programme, 2019**

**For Enrollment No. 140280001 to 140280250, 150280001 to 150280450 & 160280001 to 160280650**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
24.08.2019 & 25.08.2019	11.00 AM to 5.00 PM	XII	26.08.2019	11:30 AM to 2:30 PM
		XIV	26.08.2019	2:45 PM to 5:45 PM
		XV	27.08.2019	11:30 AM to 2:30 PM
		XVI	27.08.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

**Practical Programme for Paper-X of All Students**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
28.08.2019 to 31.08.2019	12.00 Noon to 4.00 PM	X	02.09.2019	12:00 Noon to 3:00 PM
Venue : School of Computer Education & IT, Nalanda Open University, 12 <sup>th</sup> Floor, Biscomaun Tower, Patna-800001				

**For Enrollment No. 170280001 to 170280300**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
03.09.2019 & 04.09.2019	11.00 AM to 5.00 PM	XII	05.09.2019	11:30 AM to 2:30 PM
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		XV	06.09.2019	11:30 AM to 2:30 PM
		XVI	06.09.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

**For Enrollment No. 170280301 to 170280750**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
07.09.2019 & 09.09.2019	11.00 AM to 5.00 PM	XII	11.09.2019	11:30 AM to 2:30 PM
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		XVI	12.09.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

# NALANDA OPEN UNIVERSITY

## M.Sc. Physics, Part-II

### PAPER–XV

(Advanced Condensed Matter Physics)

*Annual Examination, 2019*

**Time : 3 Hours.**

**Full Marks : 80**

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

1. What are ionic crystals ? Explain the formation of an ionic crystal and obtain an expression for its cohesive energy.
2. What is Mossbauer Effect ? Give an account of the quantum theory of Mossbauer Effect.
3. Obtain dispersion relation for a one dimensional crystal with two types of atoms and discuss the nature of optical and acoustic modes.
4. What is skin effect ? Distinguish between normal and anomalous skin effect. Give the mathematical theory of anomalous skin effect. How do you get information about Fermi surface with the help of this effect ?
5. Derive equation of state for solids and obtain Gruneisen Law.
6. Give an account of Ginzberg-Landau theory of the phenomenology of the superconducting state. How do you get coherence length ?
7. Discuss the theory of interaction of electron with optical phonons in case of polar lattice.
8. What are cooper pairs ? Calculate the interaction energy of the electron pair.
9. Describe the inelastic scattering of neutrons. What are the two methods used for defining and measuring neutron energies ?
10. Discuss A. C. Josepson effect. Show that the current oscillates with frequency  $\omega = \frac{2eV}{\hbar}$ .

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### M.Sc. Physics, Part-II

#### Practical Counseling and Practical Examination Programme, 2019

**For Enrollment No. 140280001 to 140280250, 150280001 to 150280450 & 160280001 to 160280650**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
24.08.2019 & 25.08.2019	11.00 AM to 5.00 PM	XII	26.08.2019	11:30 AM to 2:30 PM
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		XVI	27.08.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

#### Practical Programme for Paper-X of All Students

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
28.08.2019 to 31.08.2019	12.00 Noon to 4.00 PM	X	02.09.2019	12:00 Noon to 3:00 PM
Venue : School of Computer Education & IT, Nalanda Open University, 12 <sup>th</sup> Floor, Biscomaun Tower, Patna-800001				

#### For Enrollment No. 170280001 to 170280300

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
03.09.2019 & 04.09.2019	11.00 AM to 5.00 PM	XII	05.09.2019	11:30 AM to 2:30 PM
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		XVI	06.09.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

#### For Enrollment No. 170280301 to 170280750

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
07.09.2019 & 09.09.2019	11.00 AM to 5.00 PM	XII	11.09.2019	11:30 AM to 2:30 PM
		XIV	11.09.2019	2:45 PM to 5:45 PM
		XV	12.09.2019	11:30 AM to 2:30 PM
		XVI	12.09.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

# NALANDA OPEN UNIVERSITY

## M.Sc. Physics, Part-II

### PAPER–XVI

(Advanced Electronics)

Annual Examination, 2019

**Time : 3 Hours.**

**Full Marks : 80**

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

1. What is an Op-Amp ? What are the characteristics of an ideal Op-Amp ? Draw the block diagram of Op-Amp.
2. What is level translator circuit ? Why is it used with the cascaded differential amplifier ?
3. Define an oscillator. What is the principle of operation of an oscillator ? How are oscillators classified ?
4. What is logarithmic amplifier ? Show that in a logarithmic amplifier, output voltage changes as the logarithmic of the input voltage.
5. What is the difference between asynchronous and synchronous counters ? What is the advantage of an asynchronous counter ?
6. What is an adder circuit ? Explain the implementation of a half adder and a full adder circuits. Also, explain the difference between them.
7. What is a multiplexer ? Draw the logic circuit for four-to-one multiplexer. Write the Boolean equation and describe the truth-table.
8. What is encoder ? Discuss 4-bit priority encoder.
9. Describe basic hardware blocks of a computer.
10. Explain the architecture of 8086 microprocessor.

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### M.Sc. Physics, Part-II

#### Practical Counseling and Practical Examination Programme, 2019

**For Enrollment No. 140280001 to 140280250, 150280001 to 150280450 & 160280001 to 160280650**

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
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		XVI	27.08.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

#### Practical Programme for Paper-X of All Students

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
28.08.2019 to 31.08.2019	12.00 Noon to 4.00 PM	X	02.09.2019	12:00 Noon to 3:00 PM
Venue : School of Computer Education & IT, Nalanda Open University, 12 <sup>th</sup> Floor, Biscomaun Tower, Patna-800001				

#### For Enrollment No. 170280001 to 170280300

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
03.09.2019 & 04.09.2019	11.00 AM to 5.00 PM	XII	05.09.2019	11:30 AM to 2:30 PM
		XIV	05.09.2019	2:45 PM to 5:45 PM
		XV	06.09.2019	11:30 AM to 2:30 PM
		XVI	06.09.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				

#### For Enrollment No. 170280301 to 170280750

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
07.09.2019 & 09.09.2019	11.00 AM to 5.00 PM	XII	11.09.2019	11:30 AM to 2:30 PM
		XIV	11.09.2019	2:45 PM to 5:45 PM
		XV	12.09.2019	11:30 AM to 2:30 PM
		XVI	12.09.2019	2:45 PM to 5:45 PM
Venue : Physics Lab, 1 <sup>st</sup> Floor Biscomaun Tower, Patna-800001				



**NALANDA OPEN UNIVERSITY**

**M.Sc. Physics, Part-II**

**PAPER–X** [Computer Practical]

(Programming with Fortran and C++)

**SET-A**

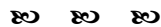
*Annual Examination, 2019*

**Time: 3 Hours.**

**Full Marks: 20**

*Answer all questions. All questions carry equal marks.*

1. Write a program to accept two numbers from the user and display its sum on screen.
2. Write a program to accept two numbers from the user and display the biggest number on the screen.
3. Write a program to accept 1, 2 & 3 and display 1 for English, 2 for Hindi and 3 for French and in case of other than these three numbers entered by the user, display a message – wrong entry using Select .... Case statement.



**NALANDA OPEN UNIVERSITY**

**M.Sc. Physics, Part-II**

**PAPER–X** [Computer Practical]

(Programming with Fortran and C++)

**SET-B**

*Annual Examination, 2019*

**Time: 3 Hours.**

**Full Marks: 20**

*Answer all questions. All questions carry equal marks.*

1. Write a program to accept two numbers from the user and display its multiplication on screen.
2. Write a program to print multiplication table of 2 in reverse order.
3. Write a program to accept 1, 2 & 3 and display 1 for Patna, 2 for Delhi and 3 for Lucknow and in case of other than these three numbers entered by the user, display a message – wrong entry using Select .... Case statement.

