# NALANDA OPEN UNIVERSITY

## B.Sc. Physics, Part-I

## PAPER–I (Honours)

(Methods of Mathematical Physics and Mechanics, Special Theory of Relativity, Waves and Vibration)

***Annual Examination, 2021***

**Time : 3 Hours.** **Full Marks : 80**

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

### GROUP 'A'

1. Obtain an expression for the force acting on a particle in a rotating frame and explain centripetal & centrifugal forces.
2. State and explain the principle of least action. On its basis deduce Lagrange's equation of motion.
3. Deduce an equation of motion of a compound pendulum by writing the Lagrangian of the same.
4. Define divergence and curl of a vector. Write their expressions in the Cartesian and the spherical polar coordinates.
5. Write position coordinate of a particle in Cartesian, spherical polar and cylindrical polar coordinate systems and give their inter relations. Also write expression for infinitesimal volume element in each of them.

### GROUP 'B'

6. Obtain an expression for variation of mass of a particle with its velocity.
7. State and explain Einstein's postulates of special theory of relativity and deduce Lorentz transformations.
8. Use Lorentz transformations to explain Doppler's effect and aberation of light.

### GROUP 'C'

9. Deduce differential equation of damped motion and discuss its solutions.
10. Write notes on any ***Two*** of the following :—
    (a) Generalized coordinates and momenta.
    (b) D' Alembert's Principle.
    (c) Length contraction and Time dilatation.
    (d) Kepler's laws of planetary motion.

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### EXAMINATION PROGRAMME, 2021

## B.Sc. Physics (Hons.), Part-I

| ***Date*** | ***Papers*** | ***Time*** | ***Examination Centre*** |
|---|---|---|---|
| 07.03.2022 | Honours Paper-I | 2.30 PM to 5.30 PM | Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna |
| 09.03.2022 | Honours Paper-II | 2.30 PM to 5.30 PM | Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna |
| 11.03.2022 | Hindi Composition-100 or Hindi-50 + Urdu-50 or Eng-50 | 2.30 PM to 5.30 PM | Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna |
| **12.03.2022** | **Chemistry (Sub)-I** | **2.30 PM to 5.30 PM** | **A. N. College, Boring Road, Patna-800013** |
| **14.03.2022** | **Physics (Sub)-I** | **2.30 PM to 5.30 PM** | **A. N. College, Boring Road, Patna-800013** |
| 24.03.2022 | Mathematics (Sub)-I | 2.30 PM to 5.30 PM | Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna |
| 25.03.2022 | Botany (Sub)-I | 2.30 PM to 5.30 PM | Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna |
| 26.03.2022 | Zoology (Sub)-I | 2.30 PM to 5.30 PM | Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna |
| 29.03.2022 | Home Science (Sub) P-I | 2.30 PM to 5.30 PM | Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna |
| 30.03.2022 | Geography (Sub) P-I | 2.30 PM to 5.30 PM | Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna |

# NALANDA OPEN UNIVERSITY

## B.Sc. Physics, Part-I

## PAPER–II (Honours)

(Heat, Thermodynamics and Statistical Physics)

***Annual Examination, 2021***

**Time : 3 Hours.** **Full Marks : 80**

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

### GROUP 'A'

1. Explain the principle of equipartition of energy. Deduce the expression for the mean energy per degree of freedom for a system of gases $(= ½kT)$.
2. Give Einstein theory of Brownian motion and obtain an expression for the average square displacement of particles under this motion.
3. Explain steady state of a metal rod being heated continuously at one end and deduce an expression for temperature distribution on it in this state.
4. Give Maxwell's theory A velocity distribution in a perfect gas and hence discuss mean velocity and most probable velocity.
5. On the basis of Virial theory deduce Van-der Wall's equation of state of a real gas.

### GROUP 'B'

6. Describe porns plug experiment and discuss Joule-Thomson effect.
7. Explain statistical basis of thermodynamics and explain the second law of thermodynamics on its basis.
8. Derive Maxwell's thermodynamics relations. Apply them to explain at least two thermodynamic problems.
9. Derive Clausins Clapeyron equation for first order phase transition.
10. Write notes on any ***Two*** of the following :—
    (a) Chemical potential. (b) Thermodynamical probability.
    (c) Reversible and irreversible thermal processes. (d) Triple point.

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## B.Sc. Physics (Hons.), Part–I

***Programme for Practical Counselling Classes and Practical Examination, 2021***

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

***For Enrollment No. : 190500001 to 190500300 and 200500001 to 200500063***

| *Counselling Class Programme* | | *Practical Examination Programme* | | |
|---|---|---|---|---|
| ***Date*** | ***Time*** | ***Paper*** | ***Date*** | ***Time*** |
| 31.03.2022 | 9.00 AM to 1.00 PM | I (Hons.) | 01.04.2022 | 9:00 AM to 11:00 AM |
| | | II (Hons.) | 01.04.2022 | 11:00 AM to 1:00 PM |

***For Enrollment No. : 200500064 to 200500150***

| *Counselling Class Programme* | | *Practical Examination Programme* | | |
|---|---|---|---|---|
| ***Date*** | ***Time*** | ***Paper*** | ***Date*** | ***Time*** |
| 31.03.2022 | 1.00 PM to 5.00 PM | I (Hons.) | 01.04.2022 | 1:00 AM to 3:00 PM |
| | | II (Hons.) | 01.04.2022 | 3:00 PM to 5:00 PM |

***For Enrollment No. : 200500151 to 200500232***

| *Counselling Class Programme* | | *Practical Examination Programme* | | |
|---|---|---|---|---|
| ***Date*** | ***Time*** | ***Paper*** | ***Date*** | ***Time*** |
| 02.04.2022 | 9.00 AM to 1.00 PM | I (Hons.) | 04.04.2022 | 9:00 AM to 11:00 AM |
| | | II (Hons.) | 04.04.2022 | 11:00 AM to 1:00 PM |

***For Enrollment No. : 200500233 to 200500323***

| *Counselling Class Programme* | | *Practical Examination Programme* | | |
|---|---|---|---|---|
| ***Date*** | ***Time*** | ***Paper*** | ***Date*** | ***Time*** |
| 02.04.2022 | 1.00 PM to 5.00 PM | I (Hons.) | 04.04.2022 | 1:00 AM to 3:00 PM |
| | | II (Hons.) | 04.04.2022 | 3:00 PM to 5:00 PM |

***For Enrollment No. : 200500324 to 200500394***

| *Counselling Class Programme* | | *Practical Examination Programme* | | |
|---|---|---|---|---|
| ***Date*** | ***Time*** | ***Paper*** | ***Date*** | ***Time*** |
| 05.04.2022 | 9.00 AM to 1.00 PM | I (Hons.) | 06.04.2022 | 9:00 AM to 11:00 AM |
| | | II (Hons.) | 06.04.2022 | 11:00 AM to 1:00 PM |

***For Enrollment No. : 200500395 to 200500500***

| *Counselling Class Programme* | | *Practical Examination Programme* | | |
|---|---|---|---|---|
| ***Date*** | ***Time*** | ***Paper*** | ***Date*** | ***Time*** |
| 05.04.2022 | 1.00 PM to 5.00 PM | I (Hons.) | 06.04.2022 | 1:00 AM to 3:00 PM |
| | | II (Hons.) | 06.04.2022 | 3:00 PM to 5:00 PM |

# NALANDA OPEN UNIVERSITY

## B.Sc. Physics, Part-I

## PAPER–I (Subsidiary)

***Annual Examination, 2021***

**Time : 3 Hours.** **Full Marks : 80**

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

1. Deduce an expression for torsional torque to produce a twist $\theta$ at the lower end of a metal wise which is fixed at the upper end. Derive expression for time period of torsional oscillation of this wire.
2. Applying Fourier series discuss the method of evaluation of its coefficients. Apply it to the case of vibration of a plucked vibration.
3. Show that Wien's displacement law may be derived from the Planck's quantum theory of radiation.
4. Differentiate between holonomic and non-holonomic constraints. Before this explain generalised coordinates and momenta.
5. State and explain the Einstein's postulates of the special theory of relativity. Discuss Lorentz transformation equations on their basis.
6. Define and deduce expression for the clastic constants Y, k, $\eta$ and $\sigma$ and establish relation between them.
7. Give the theory of Michelson'-Morley experiment. Discuss the result of this experiment.
8. What do you mean by ultrasonics supersonics ? Discuss the production and applications of ultrasonics.
9. Give the different kinds of statements of the second law of thermodynamics and discuss their different respective aspects.
10. Derive Vander Waal's equation of state for a real gas. Evaluate its coefficients a and b is terms of critical pressure Pc, critical volume Vc and critical temperature Tc.

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***Practical Counselling Classes and Practical Examination Programme, 2021 of***

## B.Sc., Part-I (Physics Subsidiary, Paper-I)

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

**PRACTICAL COUNSELLING CLASS PROGRAMME**

| Date | Time | | | |
|---|---|---|---|---|
| | **9:00 AM to 11:00 AM** | **11:00 AM to 1:00 PM** | **1:00 PM to 3:00 PM** | **3:00 PM to 5:00 PM** |
| 07.04.2022 | Enrollment No. of Mathematics (Hons.) Students 190490001 to 190490300 200490001 to 200490110 | Enrollment No. of Mathematics (Hons.) Students 200490111 to 200490205 | Enrollment No. of Mathematics (Hons.) Students 200490206 to 200490350 | Enrollment No. of Mathematics (Hons.) Students 200490351 to 200490600 |
| 9.04.2022 | — | Enrollment No. of Chemistry (Hons.) Students 190470001 to 190470200 200470001 to 200470100 | Enrollment No. of Chemistry (Hons.) Students 200470101 to 200470600 | All New & Old Students of Botany (Hons.), Yoga (Hons.), Zoology (Hons.), Geography (Hons.) & Home Science (Hons.) |

**PRACTICAL EXAMINATION PROGRAMME**

| Date | Time | | | |
|---|---|---|---|---|
| | **9:00 AM to 11:00 AM** | **11:00 AM to 1:00 PM** | **1:00 PM to 3:00 PM** | **3:00 PM to 5:00 PM** |
| 11.04.2022 | Enrollment No. of Mathematics (Hons.) Students 190490001 to 190490300 200490001 to 200490110 | Enrollment No. of Chemistry (Hons.) Students 190470001 to 190470200 200470001 to 200470100 | Enrollment No. of Chemistry (Hons.) Students 200470101 to 200470600 | All New & Old Students of Botany (Hons.), Yoga (Hons.), Zoology (Hons.), Geography (Hons.) & Home Science (Hons.) |
| 12.04.2022 | Enrollment No. of Mathematics (Hons.) Students 200490111 to 200490205 | Enrollment No. of Mathematics (Hons.) Students 200490206 to 200490350 | Enrollment No. of Mathematics (Hons.) Students 200490351 to 200490600 | — |

# Nalanda Open University
## Annual Examination - 2021
## 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** Questions from group 'B'.*
*All questions carry equal marks.*

### Group - A

1. Describe the construction and the working of a Babinet's compensator.
2. Describe the construction and the theory of working of a Nicol prism. HOw is it used used as a polariser and analyser ?
3. What is Rayleigh criterion of resolution ? Deduce expression for resolving power of a microscope.
4. Describe the construction of a zone plate and show that it has a number of Focci. Enumerate the difference between a zone plate and a convex lens.
5. Describe the construction and the theory of working of a diffraction grating. Derive an expression for its resolving power.
6. Describe the construction and the theory of a Michelson's interferometer.

### Group - B

7. Write down Maxwell's equations and deduce the equation of plane e.m. wave in vacuum. Show that the velocity of this wave in equal to that of light.
8. Discuss the laws of reflection and refraction on the basis of e.m. waves.
9. Discuss the theory of Thomson's scattering of e.m. waves.
10. Write notes on any ***Two*** of the following :-

    (a) Scattering of e.m. waves (b) Poynting Vector

    (c) Maxwell stress tensor (d) Dispersion in gases

# Nalanda Open University, Patna

***Programme of B.Sc. Part-II Physics (Hons.),***
***Practical Class and Practical Examination, 2021***

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

### (A) Practical Counselling Class

| *Date* | *Paper* | *Time* | *Roll No.* |
|---|---|---|---|
| 17.05.2022 | III & IV | ***10:30 AM to 05:00 PM*** | ***All Old Students & 190500001-190500088*** |
| 19.05.2022 | III & IV | ***10:30 AM to 05:00 PM*** | ***190500089-190500350*** |

### (B) Practical Examination

| *Date* | *Paper* | *Time* | *Roll No.* |
|---|---|---|---|
| **18.05.2022** | III | ***10:30 AM to 01:30 PM*** | ***All Old Students & 190500001-190500088*** |
| | IV | ***02:00 PM to 05:00 PM*** | |
| **20.05.2022** | III | ***10:30 AM to 01:30 PM*** | ***190500089-190500350*** |
| | IV | ***02:00 PM to 05:00 PM*** | |

# Nalanda Open University
## Annual Examination - 2021
## B.Sc. Physics (Honours), Part-II
## Paper-IV (Electrostatics, Magnetism current Electricity and Modern Physics)

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

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

1. Give the theory of Anderson's a.c. bridge. Give its relevant vector diagram.
2. Obtain the resonance frequency of a series resonant circuit. Discuss the sharpness of resonance of the Circuit.
3. Obtain the electric potential and field due to a linear quadrupole at a point away from it.
4. Give Einstein's quantum hypothesis and hence write down the famous photoelectric equation. Explain work function and threshold frequency.
5. Discuss Langern's theory of paramagnetism. What are its shortcomings.
6. Describe Geiger Muller counter and explain the theory of its working.
7. Define peltier coefficient ($\pi$) and Thomson's coefficient ($\sigma$). Applying the laws of thermodynamics to a thermocouple circuit, establish the relations

   (a) $\pi = T\frac{dE}{dT}$ (b) $\sigma = -T\frac{d^2E}{dT^2}$
8. Describe the theory of Thomson's method to determine the value of e/m.
9. Explain Compton effect and find expression for change in wave length of light.
10. Describe a Cyclotron and give the theory of its working. Obtain expression for energy of the particle accelerated by it.

# Nalanda Open University, Patna

***Programme of B.Sc. Part-II Physics (Hons.),***
***Practical Class and Practical Examination, 2021***

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

### (A) Practical Counselling Class

| *Date* | *Paper* | *Time* | *Roll No.* |
|---|---|---|---|
| 17.05.2022 | III & IV | ***10:30 AM to 05:00 PM*** | ***All Old Students & 190500001-190500088*** |
| 19.05.2022 | III & IV | ***10:30 AM to 05:00 PM*** | ***190500089-190500350*** |

### (B) Practical Examination

| *Date* | *Paper* | *Time* | *Roll No.* |
|---|---|---|---|
| **18.05.2022** | III | ***10:30 AM to 01:30 PM*** | ***All Old Students & 190500001-190500088*** |
| | IV | ***02:00 PM to 05:00 PM*** | |
| **20.05.2022** | III | ***10:30 AM to 01:30 PM*** | ***190500089-190500350*** |
| | IV | ***02:00 PM to 05:00 PM*** | |

# Nalanda Open University
## Annual Examination – 2021
## (Only for Yoga Hon's)
### B.Sc. Physics (Subsidiary), Part-II
### Paper-II

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

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

1. What is LASER? Discuss the construction and working of Ruby Laser.
2. Discuss the growth of charge in a d.c. circuit having resistance, inductance & capacitance.
3. Describe the millikan's Oil Drop method of measurement of charge on an electron using neat diagram and derive the necessary formula.
4. Define electric Intensity $\vec{E}$, electric polarisation $\vec{P}$ and electric displacement $\vec{D}$ and establish a relation between them.
5. State Brewster's law. How will you change unpolarised light into plane polarised light by reflection? What is double refraction.
6. Explain Seeback effect, Peltier effect and Thomson effect. Define Peltier Coefficient and derive its expression. What is Jhomson's coefficient.
7. Give an account of Borh's theory of hydrogen atom .
8. Distinguish between Dia, para and ferro magnetism. Give Langevin's theory of para magnetism.
9. Give the theory of Newton's ring and show how can it be used to find λ of sodium light.
10. What is photoelectric effect? Derive Einstein's photoelectric equation.

B.Sc. Zoology, Chemistry & Physics (Subsidiary), Part II, Practical Exam 2021

**[For B.Sc Yoga (Hons. Part-II Students]**

Venue: For Zoology - 1st Floor, Zoology Lab, Biscomaun Tower, Patna-1
For Physics- 1st Floor, Physics Lab, Biscomaun Tower, Patna-1
For Chemistry- 1st Floor, Chemistry Lab, Biscomaun Tower, Patna-1

**Annual Practical Examination 2021**

| Date | Time | |
|---|---|---|
| | **11.00 AM to 2.00 PM** | **2.30 PM to 05.30 PM** |
| 29.09.2022 | ---------- | Zoology (Subsidiary) |
| 30.09.2022 | Chemistry (Subsidiary) | Physics (Subsidiary) |

# Nalanda Open University

## Annual Examination - 2020

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

## Paper-V (Mathematical Physics and Classical Mechanics)

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

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

1. Discuss the solution of Laplace's equation $\nabla^2\phi = o$ in spherical polar coordinals.
2. State and prove Laurent's theorem.
3. (a) Using the method of separation of Variables solve the differential equation $\frac{du}{dx} = 2\frac{du}{dt} + u$ where $u = u(x,t)$

   (b) What is Dirac delta function? Show that $x\delta(x) = o$
4. State and prove Cauchy's Residue theorem.
5. Describe the equation of motion of a symmetric top. Discuss the special case of a sleeping top.
6. Write the Lagrangian of motion of a double pendulum and deduce the frequency of its motion.
7. What are Poisson's brackets? State and prove none of its properties.
8. Explain canonical transformation. Prove that the transformations $P = \frac{1}{2}(p^2 + q^2)$, $Q = \tan^{-1}(\frac{1}{2})$ are canonical.
9. Apply action-angle variables method to find time period of small oscillation of a simple pendulum.
10. Write notes on any Two of the following :-
    (a) M.I. of rigid body.
    (b) Hamilton's equation of motion
    (c) D Alembert's principle
    (d) Principle of least action.

## Programme of B.Sc. Part-III Physics (Hons.)

## Annual Practical Counselling & Practical Examination - 2020

Venue : *4th Floor Biscomaun Bhawan, Patna - 800 001*

***Practical Counselling***

| *Date* | *Paper* | *Time* | *Roll No* |
|---|---|---|---|
| **02.01.2021 and 04.01.2021** | VII & VIII | 10.30 AM to 05.00 PM | 120500001 to 120500100<br>150500001 to 150500100<br>160500001 to 160500210 |
| **05.01.2021 and 06.01.2021** | VII & VIII | 10.30 AM to 05.00 PM | 170500001 to 170500250 |

***Practical Examination***

| *Date* | *Paper* | *Time* | *Roll No* |
|---|---|---|---|
| **07.01.2021** | VII | 10.30 AM to 01.30 PM | 120500001 to 120500100<br>150500001 to 150500100<br>160500001 to 160500210 |
| | VIII | 02.00 PM to 05.00 PM | |
| **08.01.2021** | VII | 10.30 AM to 01.30 PM | 170500001 to 170500250 |
| | VIII | 02.00 PM to 05.00 PM | |

# NALANDA OPEN UNIVERSITY

## B.Sc. Physics, Part-III

## PAPER–VI (Honours)

(Quantum Mechanics and Statistical Mechanics)

***Annual Examination, 2021***

**Time : 3 Hours.** **Full Marks : 80**

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

1. Write down the fundamental assumptions of statistical mechanics. Define and explain the three types of statistical ensembles.

2. What are basic postulates of quantum mechanics ? Explain correspondence principle in quantum mechanics.

3. What do you mean by statistical entropy ? Obtain expression for entropy of an ideal gas. What is Gibb's paradox and how is it explained ?

4. Give the physical interpretation of wave function. Derive Schrödinger equation in both (i) time independent and (ii) time dependent cases.

5. Deduce Bose Einstein statistics for bosons and obtain Plancle's radiation formula.

6. Define angular momentum $\left(\vec{L}\right)$ in quantum mechanics. Show that Lx, Ly and Lz commute with $L^2$ but they do not commute with each other.

7. State and prove Liouville's theorem.

8. Define expectation value of a quantum mechanical operator and show that it corresponds to a classical observable.

9. Give the possible states of the He-atom and its Hamiltonian. Also, find ground state of the He-atom and its energy.

10. What are symmetric and antisymmetric wave functions ? Discuss their important properties.

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## Programme of B.Sc. Part-III Physics (Hons.)
## Annual Practical Counselling & Practical Examination - 2021

Venue : *1st Floor, Physics Lab, Biscomaun Bhawan, Patna - 800 001*

***Practical Counselling***

| *Date* | *Paper* | *Time* | *Roll No* |
|---|---|---|---|
| **30.06.2022** | VII & VIII | 10.30 AM to 05.30 PM | All Old & New Students |

***Practical Examination***

| *Date* | *Paper* | *Time* | *Roll No* |
|---|---|---|---|
| **01.07.2022** | VII | 10.30 AM to 01.30 PM | All Old & New Students |
| | VIII | 02.00 PM to 05.00 PM | |

# NALANDA OPEN UNIVERSITY

## B.Sc. Physics, Part-III

## PAPER–VII (Honours)

(Classical Electrodynamics, Plasma Physics, Physics of Atoms, Molecules & Nuclei)

***Annual Examination, 2021***

**Time : 3 Hours.** **Full Marks : 80**

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

1. Give a brief account of the liquid drop model of nucleus. Explain magic number of the nuclei.
2. Explain Lienard-wiechert potential. Calculate the intensities of electric and magnetic field due to a uniformly moving charge making use of this potential.
3. Explain the theory of molecular spectra of diatomic molecule treated as a harmonic vibrator. What are the shortcomings of this model ?
4. Explain plasma state and describe plasma parameters. Discuss collective behaviour of plasma and explain concept of temperature in plasma.
5. Describe the construction and the principle of working of a He-Ne laser.
6. Establish the covariance of Maxwell's equations under Lorentz transformation.
7. Describe the Stern-Gerlach experiment and explain how does it explain the existence of spin magnetic moment of nucleus.
8. Give quantum mechanical treatment of Paschen-Back effect.
9. What do you mean by NMR spectroscopy ? Describe with diagram the continuous wave NMR spectrometer.
10. Explain spin magnetic moment and electric quadrupole magnetic moment associated with atomic nucleus.

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## Programme of B.Sc. Part-III Physics (Hons.)
## Annual Practical Counselling & Practical Examination - 2021

Venue : *1st Floor, Physics Lab, Biscomaun Bhawan, Patna - 800 001*

***Practical Counselling***

| *Date* | *Paper* | *Time* | *Roll No* |
|---|---|---|---|
| **30.06.2022** | VII & VIII | 10.30 AM to 05.30 PM | All Old & New Students |

***Practical Examination***

| *Date* | *Paper* | *Time* | *Roll No* |
|---|---|---|---|
| **01.07.2022** | VII | 10.30 AM to 01.30 PM | All Old & New Students |
| | VIII | 02.00 PM to 05.00 PM | |

# NALANDA OPEN UNIVERSITY

## B.Sc. Physics, Part-III

## PAPER–VIII (Honours)

(Condensed Matter Physics & Electronics)

***Annual Examination, 2021***

**Time : 3 Hours.** **Full Marks : 80**

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

1. State and prove (a) Norton's theorem and (b) Reciprocity theorem.
2. What is an Amplifier ? Discuss the working of an R.C. Coupled amplifier with a circuit diagram. Obtain expression for voltage gain.
3. Explain the principle of frequency modulation. Define frequency deviation and the modulation index for frequency modulated carrier.
4. What is a Photodiode ? Discuss its working and uses with the help of its characteristic curve.
5. Distinguish between Einstein's theory and Debye theory of specific heat of solids. Discuss Debye theory and explain why this theory is most successful.
6. What is Lattice Energy ? Calculate the lattice energy of an ionic crystal. Define Madlung constant and show that for an infinite line of ions its values is 2ln2.
7. Explain Hall effect. Define Hall coefficient and give its importance. How are they determined in the laboratory ?
8. Deduce Laue's equation of diffraction of x-ray by a crystal and obtain Bragg's diffraction condition from them.
9. Explain the nuclear shell model. How this model is used to explain the angular momentum of ground slate of the nucleus.
10. What is a zener diode ? Explain its working. How can it be used as a voltage stabilizer ?

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## Programme of B.Sc. Part-III Physics (Hons.)
## Annual Practical Counselling & Practical Examination - 2021

Venue : *1st Floor, Physics Lab, Biscomaun Bhawan, Patna - 800 001*

***Practical Counselling***

| *Date* | *Paper* | *Time* | *Roll No* |
|---|---|---|---|
| **30.06.2022** | VII & VIII | 10.30 AM to 05.30 PM | All Old & New Students |

***Practical Examination***

| *Date* | *Paper* | *Time* | *Roll No* |
|---|---|---|---|
| **01.07.2022** | VII | 10.30 AM to 01.30 PM | All Old & New Students |
| | VIII | 02.00 PM to 05.00 PM | |