NALANDA OPEN UNIVERSITY
M.Sc. Physics, Part-I
PAPER–I
(Mathematical Physics)

Annual Examination, 2021

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

Answer any Five Questions.
All questions carry equal marks.

1. Show that the integral representation of Laguerre polynomials is given by

$$L_n(x) = \frac{e^x}{n!}\int_0^{oo} e^{-1}.\, t^n\ J_0\left[2(xt)^{\frac{1}{2}}\right]dt.$$

Where J_o is the Bessel's functions of Zero order.

2. Find the equation of motion for a charged particle in an electromagnetic field using the Hamiltonian of the particle.

3. Find g and g^{jk} corresponding to $ds^2 = 5\,(dx^1)^2 + 3\,(dx^2)^2 + 4\,(dx^3)^2 - 6\,dx^1\,dx^2 + 4dx^2dx^3$.

4. 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.

5. If ϕ is an invariant, determine whether $\frac{\partial^2\phi}{\partial x^p\,\partial x^q}$ is a tensor.

6. Write notes on orthonormality of column and row vectors. Prove that eigenvectors of a symmetric matrix corresponding to different eigenvalues are orthogonal.

7. State and prove (a) Parseval's theorem (b) Convolution theorem of Fourier-transforms.

8. Starting with the series expansion, derive Rodrigues formula for Legendre polynomials.

9. Find the Laplace transform for (a) $3t^4 - 2t^3 + 4\,e^{-3t} - 2Sin\,5t + 3\,Cos2t$.

10. Derive integral representation of $J_n(x)$, the Bessel's function of first kind of order n.

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EXAMINATION PROGRAMME-2021
M.Sc. Physics, Part-I

Date	Papers	Time	Examination Centre
14.05.2022	Paper–I	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna
18.05.2022	Paper–II	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna
21.05.2022	Paper–III	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna
25.05.2022	Paper–IV	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna
27.05.2022	Paper–V	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna
31.05.2022	Paper–VI	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna
02.06.2022	Paper–VII	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna
04.06.2022	Paper–VIII	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna

NALANDA OPEN UNIVERSITY

M.Sc. Physics, Part-I

PAPER–II

(Quantum Mechanics)

Annual Examination, 2021

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

Answer any Five Questions.
All questions carry equal marks.

1. Find the energy levels and energy eigenfunctions of a particle of mass m moving in a potential
$V(x) = ½kx^2, \quad x > 0$
$= \infty, \quad x < 0$.

2. Obtain expressions for the group velocity and the phase velocity of a de-Broglie wave.

3. Present the quantum mechanical theory of H-like atoms and discuss its energy level diagram in relation to potential.

4. State Ehrenfest's theorem and show that classical mechanics agrees with quantum mechanics so far as the expectation values are concerned.

5. On the basis of WKB method discuss the case of one dimensional harmonic oscillator and show that the theoretical results match with exact results.

6. 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
$V(x) = -V_0, \quad 0 < x < a$
$= 0, \quad x < 0 \text{ and } x > a$.

7. Discuss the scattering of particles by a spherically symmetric potential. Explain partial wave and phase shift.

8. (a) Prove that momentum operator is self adjoint.
(b) Find the commutation relations of components of angular momentum.

9. State and explain Fermi's golden rule. What do you understand by adiabatic and sudden approximation ?

10. Starting with momentum-position uncertainty obtain
(a) $\Delta\phi \cdot \Delta\ell \geq \frac{\hbar}{2}$ (b) $\Delta E \cdot \Delta t \geq \frac{\hbar}{2}$.

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NALANDA OPEN UNIVERSITY

M.Sc. Physics, Part-I

PAPER–III

(Electrodynamics and Plasma Physics)

Annual Examination, 2021

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

Answer any Five Questions.
All questions carry equal marks.

1. What is Plasma ? Give the key difference between plasma and normal gas. Derive an expression for Debye length.
2. Calculate vector potential of a current loop.
3. Derive the zeroth, first and second moments of Boltzmann's equation.
4. Show that D' Alembertian operator $\Box^2$ is invariant under Lorentz transformation.
5. Derive expression for plasma frequency. Explain the significance of lower and upper hybrid frequencies.
6. Explain advanced and retarded potential. Obtain an expression for angular distribution of power for uniformly moving point charge.
7. While discussing the behaviour of plasma particles in static magnetic field, deduce and discuss Larmour frequency.
8. Give notes on (a) Synchrotron radiation (b) Cerenkov radiation.
9. Discuss the motion of a charged particle in oscillating magnetic fields.
10. Explain the following terms (a) Match number, (b) Reynold's number, (c) Stuart number and (d) Hartmann number.

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NALANDA OPEN UNIVERSITY

M.Sc. Physics, Part-I

PAPER–IV

(Statistical Mechanics)

Annual Examination, 2021

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

Answer any Five Questions.
All questions carry equal marks.

1. Derive Virial equation of state and evaluate the Virial coefficients.
2. State and prove Boltzmann theorem of entropy. Obtain expression for the entropy of a monatomic gas.
3. What are critical indices ? Explain the different scaling relations and the critical indices.
4. What do you mean by partition function ? Show that partition function of a monatomic gas is given by $Z = \frac{V}{h^3}(2\pi m k T)^{3/2}$.
5. Describe two dimensional *Ising* model and show how does it explain the phenomenon of spontaneous magnetization.
6. State and explain the fundamental assumptions of statistical mechanics. Explain phase space and density of states.
7. Show that the pressure exerted by a Fermi gas at $T = 0$ is $P_F = \frac{2}{5}\left(\frac{N}{V}\right)E_F$, where E_F is Fermi Energy.
8. Explain microcanonical and grand canonical ensembles. Derive Sackur-Tetrod equation for a perfect gas.
9. What is phase transition ? Explain the first order and the second order phase transitions. Discuss Landau theory of phase transition.
10. Write notes on any ***Two*** of the following :—
    (a) Gibbs' paradox.
    (b) Scale transformation in phase transition.
    (c) Bose-Einstein Condensation.
    (d) Phase-space, trajectory of phase point and density of states.

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NALANDA OPEN UNIVERSITY

M.Sc. Physics, Part-I

PAPER–V

(Nuclear and Particle Physics)

Annual Examination, 2021

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

Answer any Five Questions. All questions carry equal marks.

1. Define total and differential cross section. Describe experimental determination of cross section.

2. Describe the compound nucleus theory of nuclear reactions. Give experimental evidences in support of this theory.

3. Give an account of the nature of the force existing between a proton and a neutron in a deuteron for the ground state.

4. Describe Wu's experiment and give its interpretation to explain the non-conservation of parity in weak interaction.

5. Discuss neutron-proton scattering at low energies. What light does it throw on the nature of nuclear force ?

6. Give a brief account of Fermi's theory of β-decay and show how it was necessary to postulate the existence of neutrino.

7. Show that the nuclear force is spin dependent. Justify your answer with substantive experimental facts.

8. What are stripping and pick-up reactions ? Obtain an expression for the reaction amplitude using Butler theory for stripping and pick-up reactions.

9. Describe the basic ideas of Yukawa's meson exchange theory of the nuclear forces. Give the properties of π-meson.

10. Give the simple Briet-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.

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NALANDA OPEN UNIVERSITY

M.Sc. Physics, Part-I

PAPER–VI

(Atomic and molecular Physics)

Annual Examination, 2021

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. Discuss briefly the various factors which contribute to the broadening of spectral line.
2. Describe and explain the different types of coupling of vector atomic models. Give their respective merits.
3. Write down Schrödinger equation of electron atom and solve it by the method of separation of variables. Explain the physical meaning of the different quantum numbers that come out in the solution.
4. State and explain Pauli's exclusion principle and discuss how this principle is connected with the symmetry of the wave function.
5. How does the nuclear spin affect the hyperfine structure of the emission spectra of atoms.

GROUP 'B'

6. What do you mean by ESR ? Explain the basic principles of interaction of electrons spin and applied magnetic field.
7. 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 moment of inertia is 2.66×10^{-47} kg.m².
8. Discuss the principal features of the electronic spectrum of a diatomic molecule.
9. Explain Tranc-condon principle and give its wave mechanical interpretation. How does it help in understanding the intensity distribution in Vibrational structure of the electronic transitions of a diatomic molecule.
10. Write notes on any ***Two*** of the following :—
    (a) LS and JJ Coupling.
    (b) Raman spectra of diatomic molecules.
    (c) Spin-spin coupling between two or more nuclei.
    (d) NMR spectroscopy.

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प्रायोगिक परामर्श कक्षा एवं प्रायोगिक परीक्षा का कार्यक्रम पार पृष्ठ पर देखें ।

NALANDA OPEN UNIVERSITY

M.Sc. Physics, Part-I

PAPER–VII

(Condensed Matter Physics)

Annual Examination, 2020

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

Answer any Five Questions. All questions carry equal marks.

1. (a) State and prove Bloch theorem.
   (b) Explain the significance of the effective mass of the electron.
2. What are Miller indices ? How the orientation of a plane is specified by Miller indices ? Explain their importance. Write down the Miller indices for planes with intercepts $(a,\ 2b,\ \alpha)$.
3. Describe the tight binding approximation for calculating the energy states of an electron in a solid. How can this method be compared with the nearby free electron model in the case of a metal.
4. Derive the 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.
5. Discuss the quantization of electron orbits in magnetic field.
6. How are Brillouin Zones constructed ? Describe and sketch the first Brillouin Zones of bcc and fcc lattices. Mention their importance in crystal analysis.
7. Explain the difference between Type I and Type II superconductors. Prove that Meissner effect and the disappearance of resistinity in a superconductor are mutually consistant.
8. What is atomic scattering factor ? Derive the general expression for the atomic scattering factor using spherical polar coordinates.
9. Discuss Kronig-Penny model for a linear lattice. How does it lead to the formation of bands in solids.
10. Explain the Schottky and the Frenkel defects. Calculate the equilibrium concentration defects and indicate the order of their magnitude.

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NALANDA OPEN UNIVERSITY

M.Sc. Physics, Part-I

PAPER–VIII

(Electronic Devices)

Annual Examination, 2021

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

Answer any Five Questions.
All questions carry equal marks.

1. What is meant by magneto optic effect ? Explain it with special reference to Faraday effect and magneto-optic-Kerr effect.
2. Describe the design and operating characteristics of tunnel diode. What is meant by tunneling ?
3. State and explain (i) Electrostrictive effect and (ii) Magnetostrictive effect.
4. Describe the mechanism of current flow in a properly biased BJT. Define the various parameters of BJT.
5. What are ferroelectric materials ? Discuss their classification. Give the important properties of these materials.
6. How can NMOS device be used to implement memory device ? Explain it.
7. Explain the transmissive and the reflective type LCD.
8. What are Lyotropic Liquid Crystals ? Discuss generic progression of phases going from low to high amphiphile concentration.
9. What do you mean by piezoelectricity ? Discuss the applications of piezoelectric materials in sensors and actuators.
10. Give an account of the theoretical treatment of liquid crystals.

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NALANDA OPEN UNIVERSITY
M.Sc. Physics, Part-II
PAPER–IX
(Computational Mathematics)
Annual Examination, 2021

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

Answer any Five Questions.
All questions carry equal marks.

1. 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 $h = 0.1$.

2. Obtain the values of $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for $x = 1.2$ using the table :—

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

3. Using Newton-Raphson formula, find a root of the equation $x \sin x + \cos x = 0$.

4. Explain the use of the Cubic Spline Method in numerical differentiation with illustrative examples.

5. Explain Monte-Carlo Method. Describe various areas where this method is applied. Explain Monte-Carlo Simulation and Monte-Carlo Integration.

6. Describe the 'Crank-Nicholson Method' to solve the parabolic differential equation. Give a suitable example.

7. 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.

8. 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 $h = 1$.

9. Using the matrix inversion method, find the solution of the following set of algebraic equation $3x + y + 2z = 3$, $2x - 3y - z = -3$ *and* $x + 2y + z = 4$.

10. Find by Gauss's formula $I = \int_{\partial}^{\ell} x\,dx$ in terms of abscissa and weights of Gaussian integration.

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EXAMINATION PROGRAMME-2021
M.Sc. Physics, Part-II

Date	Papers	Time	Examination Centre
26.07.2022	Paper–IX	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna
28.07.2022	Paper–X	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna
30.07.2022	Paper–XI	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna
01.08.2022	Paper–XII	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna
03.08.2022	Paper–XIII	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna
05.08.2022	Paper–XIV	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna
06.08.2022	Paper–XV	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna
08.08.2022	Paper–XVI	2.30 PM to 5.30 PM	Nalanda Open University, 2nd Floor, Biscomaun Bhawan, Patna

NALANDA OPEN UNIVERSITY

M.Sc. Physics, Part-II

PAPER–X

(Programming with Fortran and C^{++})

Annual Examination, 2021

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

Answer any Five Questions. All questions carry equal marks.

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

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NALANDA OPEN UNIVERSITY

M.Sc. Physics, Part-II

PAPER–XI

(Physics of Nano Materials)

Annual Examination, 2021

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

Answer any Five Questions.
All questions carry equal marks.

1. Classify crystalline into metals, semiconductors and insulators on the basis of band theory. Explain the concept of effective mass of charge carriers.

2. What is a quantum dot ? Discuss the structure and characteristics of different kinds of quantum dots.

3. What do you mean by Multiferric Magnetoelectric materials ? Describe the application of such materials.

4. 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 ?

5. What is Raman effect ? Discuss the variations in Raman Spectra of nanomaterials.

6. Obtain the eigenvalues and normalized eigenfunctions of a particle in one dimensional infinite potential box of side 'a'.

7. Explain the band formation in the hydrogen molecule. What do you understand by energy bands in Crystal ?

8. Describe the citrate precursor technique for preparation of nanoparticles.

9. What is a quantum wire ? Describe the various methods for its fabrication.

10. Describe the Hartree-Fock Approximation of the coulomb interaction between 3D confined electrons. Mention the application of Hund's rule in quantum dots.

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प्रायोगिक परामर्श कक्षा एवं प्रायोगिक परीक्षा का कार्यक्रम पार पृष्ठ पर देखें ।

NALANDA OPEN UNIVERSITY
M.Sc. Physics, Part-II
PAPER–XII
(Science and Technology of Renewable Energy)
Annual Examination, 2021

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

Answer any Five Questions.
All questions carry equal marks.

1. 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 ?

2. Explain capacity factor of wind farms. How does it help in increasing the reliability of wind farms.

3. 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 ?

4. Explain surface texturing and light trapping mechanism for a Silicon Solar Cell. What is a Lambertian Rear Reflector ?

5. Discuss the efficiency of a solar cell and explain the importance of Fill Factor in a solar cell.

6. What do you understand by band gap ? Describe the formation of intrinsic carriers and their concentration variation with temperature.

7. Explain 'Green House Effect' and the co-relation of the rise of atmospheric carbon dioxide concentration with the rise in average temperature.

8. (a) Give the methods of harnessing (i) Wave energy and (ii) Tidal energy.
   (b) What is Geotherwial Power ? Discuss its advantages and disadvantages.

9. Derive expression for total current in (a) Wide-Base Diode and (b) Narrow-Base Diode.

10. State and explain drift velocity. Derive expression for conductivity and mobility.

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प्रायोगिक परामर्श कक्षा एवं प्रायोगिक परीक्षा का कार्यक्रम पार पृष्ठ पर देखें ।

NALANDA OPEN UNIVERSITY

M.Sc. Physics, Part-II

PAPER–XIII

(Environmental Physics)

Annual Examination, 2021

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

Answer any Five Questions.
All questions carry equal marks.

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

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प्रायोगिक परामर्श कक्षा एवं प्रायोगिक परीक्षा का कार्यक्रम पार पृष्ठ पर देखें ।

NALANDA OPEN UNIVERSITY

M.Sc. Physics, Part-II

PAPER–XIV

(Photonics)

Annual Examination, 2021

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

Answer any Five Questions.
All questions carry equal marks.

1. What do you mean by beats ? Explain the concept of beats from acoustic to optical region.
2. Describe band gap and fill factor of a p-n cell. How does fill factor depend on the normalized open circuit voltage ?
3. 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.
4. What do you mean by photonics ? How is it different from electronics ? Comment on the future of this branch of physics.
5. 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.
6. Describe a Light Emitting Diode (LED). What do you mean by injected holes and electrons ?
7. Explain the difference between analog and digital communication. Why digital communication is more suitable with modern day requirement ?
8. Describe an injection laser. What is double heterojunction injection laser ? Explain the term injection.
9. Obtain a relation between divergence and waist size of the beam for a Gaussian distribution of wave energy.
10. What is mode locking operation in laser ? Prove that the output of mode locked laser in n times the power of the same laser with modes uncoupled. Describe a technique developed for achieving mode locking. What is passive mode locking ?

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प्रायोगिक परामर्श कक्षा एवं प्रायोगिक परीक्षा का कार्यक्रम पार पृष्ठ पर देखें ।

NALANDA OPEN UNIVERSITY

M.Sc. Physics, Part-II

PAPER–XV

(Advanced Condensed Matter Physics)

Annual Examination, 2021

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

Answer any Five Questions.
All questions carry equal marks.

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

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प्रायोगिक परामर्श कक्षा एवं प्रायोगिक परीक्षा का कार्यक्रम पार पृष्ठ पर देखें ।

NALANDA OPEN UNIVERSITY

M.Sc. Physics, Part-II

PAPER–XVI

(Advanced Electronics)

Annual Examination, 2021

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

Answer any Five Questions.
All questions carry equal marks.

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

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प्रायोगिक परामर्श कक्षा एवं प्रायोगिक परीक्षा का कार्यक्रम पार पृष्ठ पर देखें ।