D–2271

Sub. Code
34511

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2023.

First Semester

CLASSICAL MECHANICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. State D'Alembert's Principle.

2. Define Cyclic Coordinates.

3. State Hamilton's principle.

4. What is a Hamiltonian for a simple pendulum?

5. Define Liouville's theorem.

6. How do you check the given transformation is a canonical one?

7. Write a Lorentz transformation equation.

8. What is the product of inertia?

9. How do you determine an equilibrium point as stable or unstable?

10. What do you understand by the term normal modes?

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Obtain the Lagrange's equation for a simple pendulum. Deduce the formula for its time period.

Or

(b) Classify the different dynamical system – Explain.

12. (a) Using the technique of the calculus of variations. Derive the Euler – Lagrange's equation of motion from Hamilton's principle.

Or

(b) Derive time – Independent Hamilton – Jacobi equation.

13. (a) Obtain Einstein formula for addition of velocities.

Or

(b) Derive an expression for angular momentum of a Rigid body.

14. (a) Discuss the Euler's angle as the generalized coordinates for a rigid body motion.

Or

(b) In special theory of relativity mass and energy are equivalent. Discuss the statement with example.

15. (a) Derive an expression for the equation of motion for the two coupled oscillators.

Or

(b) Write a short note on :

(i) Normal modes

(ii) Normal coordination.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Obtain Lagrenge's equation for general system.

17. Explain Hamilton – Jacobi formalism using simple harmonic oscillator.

18. Write in detail about Eulerian angles. Use schematic diagram wherever necessary.

19. Derive Lorentz transformation equation.

20. Obtain the normal modes of two coupled masses.

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D–2272	Sub. Code
	34512

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2023.

First Semester

MATHEMATICAL PHYSICS – I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. What is line integral?

2. Find $\nabla \cdot \vec{r}$ where $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$.

3. Show that the matrix $\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ is orthogonal.

4. Find the characteristic equation of the matrix $A = \begin{bmatrix} 1 & 2 & -2 \\ 1 & 1 & 1 \\ 1 & 3 & -3 \end{bmatrix}$.

5. What is the rank of the matrix $\begin{bmatrix} 2 & 1 & -1 \\ 0 & 3 & -2 \\ 2 & 4 & -3 \end{bmatrix}$

6. If $\lceil n = \int_0^\infty e^{-x} x^{n-1}\, dx$ for $n > 0$, then $\lceil 1 =$ ————————.

7. Define Beta function.

8. Prove that $J_n(-x) = (-1)^n J_n(x)$.

9. Find the Laplace transform of $f(t) = 1$.

10. Write the Fourier Cosine integral for $f(x)$.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Prove that $\nabla(u+v) = \nabla u + \nabla v$.

Or

(b) Find m so that the vectors $2\hat{i} - 4\hat{j} + 5\hat{k}$; $\hat{i} - m\hat{j} + \hat{k}$; and $3\hat{i} + 2\hat{j} - 5\hat{k}$ are coplanar.

12. (a) Find the eigen values and eigen vectors of $\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$.

Or

(b) Reduce the matrix to normal form and find its rank $\begin{bmatrix} 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 6 \\ 4 & 5 & 6 & 7 \\ 9 & 10 & 11 & 12 \end{bmatrix}$.

13. (a) Derive the relation between Gamma function and Beta function.

Or

(b) Prove that $\left(1-2xt+t^2\right)^{-1/2}=\sum_{n=0}^{\infty}t^n p_n(x)$.

14. (a) Derive the recurrence relations of Hermite function.

Or

(b) Prove that $H_{2n}(0)=\frac{(-1)^n}{n!}2n!$.

15. (a) Find the Laplace transform of $F(t)=\frac{e^{at}-1}{a}$.

Or

(b) Write a note on convolution theorem of Fourier transform.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. State and prove the Stoke's theorem.

17. Show that the matrix A is diagonalizable $A=\begin{bmatrix}3 & 1 & -1\\ -2 & 1 & 2\\ 0 & 1 & 2\end{bmatrix}$. If so obtain the matrix P. Such that $P^{-1}AD$ is a diagonal matrix.

18. Deduce the solution of Bessel's differential equation.

19. Derive the generating function and recurrence relations of Laguerre differential equation.

20. Find the inverse Laplace transform of following function :

$$\frac{14s+10}{49s^2+28s+13}.$$

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	34513

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2023.

First Semester

LINEAR AND INTEGRATED ELECTRONICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Give some important properties of semiconductors.

2. What is the difference between diode and tunnel diode?

3. What is stabilization?

4. How does the transistor bias works?

5. What is a solar cell? Which principle is used in solar cells?

6. List out any three properties of op-amp.

7. What are the four basic types of filters?

8. Explain the basic principle of op-amp.

9. What is a DIAC and how does it works?

10. Draw the circuit diagram of Hartley oscillators.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL the questions, choosing either (a) or (b).

11. (a) What is LED? Explain its working principle.

Or

(b) Discuss about schottky diode.

12. (a) Write down the classification of power amplifiers.

Or

(b) Discuss about the methods of transistor biasing.

13. (a) How does Rc phase oscillator work? What is the main function of Phase shift oscillator?

Or

(b) Draw and explain the characteristics of SCR. State the effect of gate current on operation of SCR.

14. (a) Discuss the operation of a summing amplifier.

Or

(b) Discuss any two applications of op-amp.

15. (a) Explain the photo detectors.

Or

(b) What is an active filter and give its types?

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Discuss about the working principle, construction and characteristics of zener diode.

17. What is filter and explain four types of filter?

18. Describe the Hartley and colpitts oscillators.

19. Construct differentiator and integrator circuits using op-amp.

20. Discuss about the solar cell, types of solar cells and fabrication technology.

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D–2274

Sub. Code
34521

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2023.

Second Semester

QUANTUM MECHANICS – I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. What are the limitations the wave function of a particle must obey?

2. State Heisenberg uncertainty principle.

3. Distinguish between free and bound states.

4. What is zero point energy?

5. Define parity operator.

6. How do you represent a state vector and its conjugate vector in Dirac's notation?

7. Define Stark effect.

8. What is meant by degeneracy of a state?

9. Under what situation WKB approximation is applicable?

10. Express Fermi Golden rule.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) What is wave particle duality? Find an expression for de Broglie wavelength for a free particle.

Or

(b) Explain what are eigen function and eigen values in a wave equation with an example.

12. (a) Discuss the problem of particle in a box with the help of Schrodinger equation.

Or

(b) Derive r, θ, ϕ equation for a Hydrogen atom.

13. (a) Derive the equation for interacting picture.

Or

(b) Solve the linear harmonic oscillator problem using matrix representation.

14. (a) Distinguish between stimulated and spontaneous emission.

Or

(b) Compare the quantization condition of Wilson Sommerfeld with the one in WKB method.

15. (a) Explain the semi classical treatment of the theory of radiation.

Or

(b) What are Einstein's coefficient? Get the relation between them.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. State and prove Erhenfest's theorem.

17. Obtain an expression for the transition probability per unit time using time dependent perturbation they and explain how it is used for transitions that involve states in the continuum.

18. Solve the problem of three dimensional harmonic oscillator.

19. Obtain the first order perturbation equations for non-degenerate case.

20. Describe the theory of Rayleigh scattering.

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D–2275	Sub. Code
	34522

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2023.

Second Semester

MATHEMATICAL PHYSICS – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Find the singular point of $f(z) = \frac{1}{\sin z}$.

2. What is analytic function?

3. What are Hermitian operators?

4. The temperature distribution of the plate in the steady – state condition is ————————.

5. Define antisymmetric tensor.

6. Write the contravariant tensor of rank 4.

7. Define dummy index and give an example.

8. What is rotation symmetry?

9. Define group with an example.

10. Define classical probability.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) State and prove Cauchy's integral formula.

Or

(b) Find the residues of $f(z)=\dfrac{z}{(z-1)^3(z-2)}$ at each of the poles.

12. (a) Obtain the Sturm – Liouville equation.

Or

(b) Solve the equation $\dfrac{\partial^2 z}{\partial x^2}-2\dfrac{\partial z}{\partial x}+\dfrac{\partial z}{\partial y}=0$ by the method of separation of variables.

13. (a) Derive two dimensional heat equation.

Or

(b) Find the temperature in a bar of length 2 whose ends kept at zero and lateral surface insulated if the initial temperature is $\sin\dfrac{\pi x}{2}+3\sin\dfrac{5\pi x}{2}$.

14. (a) If A_r^{pq} and B_r^{pq} are tensors, prove that their sum and difference are tensors.

Or

(b) Define covariant and mixed tensors.

15. (a) What are symmetry elements and symmetry operators?

Or

(b) Write a note on random variables.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Derive Laurent expansion.

17. Using Residue theorem, evaluate the following integral $\int_C \frac{4-3z}{z(z-1)(z-2)}\,dz$, where '$c$' is the circle $|z| = \frac{3}{2}$.

18. Obtain the equation of vibrating string.

19. State and prove Quotient law.

20. Derive the mean and variance of Binomial distribution.

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D–2276

Sub. Code
34523

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2023.

Second Semester

ELECTROMAGETIC THEORY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. State Faraday's induction law.

2. Write down the Maxwell's equation.

3. Define skin depth.

4. What are the boundary conditions at the surface of separation of two dielectrics?

5. State Brewster's law.

6. What is total internal reflection?

7. Write down the principle of klystron.

8. Define magnetohydrodynamics.

9. Write the conditions for plasma existence?

10. Describe the anomalous dispersion.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b)

11. (a) Explain the Poynting theorem and Poynting vector.

Or

(b) Derive the integral form for the Maxwell's equation.

12. (a) Explain the propagation of EM waves in free space.

Or

(b) Explain the reflection of EM waves at non-conducting medium.

13. (a) Derive the equation for transmission coefficients in dielectric media.

Or

(b) Explain about Clasusius - Mossotti relation.

14. (a) What are Gunn diodes? Explain its working.

Or

(b) Describe the scattering and scattering parameters.

15. (a) Describe the condition for plasma existence and occurrence.

Or

(b) Explain the magnetic confinement.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions

16. Explain the continuity equation for time varying fields.

17. Explain the propagation of EM waves in Anisotropic non-conducting medium.

18. Explain the dispersion in gases.

19. Derive the equation for rectangular waveguides.

20. Describe plasma waves.

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D–2277

Sub. Code
34531

DISTANCE EDUCATION

M.Sc. (Physics) EXAMINATION, DECEMBER 2023.

Third Semester

MOLECULAR SPECTROSCOPY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. What is directed bond.
2. State Heitler – London theory.
3. Write two differences between Raman and FTIR spectra.
4. Define normal modes of vibration.
5. What is predissociation?
6. Why anti-stokes lines are less intense than stokes lines.
7. What is inverse Raman effect.
8. Write a note on two-photon absorption.
9. State Mass bauer effect.
10. What is dipole-dipole interection.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL the questions, choosing either (a) or (b).

11. (a) Write a note on SP, SP^2 and SP^3 hybridization.

Or

(b) Explain the importance to study on stark effect.

12. (a) How do you determine the structure of the molecule using IR spectroscopy?

Or

(b) Discuss the normal coordinates and normal modes of vibration in a crystal.

13. (a) Write a detail note on intensity distribution of Co molecule.

Or

(b) Discuss the effect of unharmonicity in the case of diatonic vibrating rotator.

14. (a) Describe in detail the photoacoustic Raman scattering.

Or

(b) Give a detailed account on principle, instrumentation and applications of multiphoton spectroscopy with neat diagram.

15. (a) Discuss in detail the spin-spin coupling in NMR spectrum.

Or

(b) State the principle of NQR and describe in detail its applications.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Explain in detail the valence bond theory.

17. Explain the formation of hydrosen molecule based on Heitler-London theory along with the explanation of the Potential energy curve.

18. What is Portait Parabola? Explain.

19. Discus the rotational and vibrational spectra of diatomic molecules.

20. Determine the crystal symmetry and molecular structure using mossbauer spectroscopy.

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D–2278

Sub. Code
34532

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2023.

Third Semester

QUANTUM MECHANICS – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Show that $\left[L_x L_y, L_z\right] = i\hbar\left(L_x^2 - L_y^2\right)$.

2. Write down the eigen value equations for J^2 & J_z operators.

3. What are identical and indistinguishable particles?

4. Give the differences between field and a system.

5. Define phase space.

6. What are optical electrons and optical spectrum?

7. Justify why α^s and β are note numbers and are square matrices.

8. Write down the equations that describe the particles with spin 0 and spin ½.

9. What do you mean by first and second quantization?

10. When does Born approximation fail?

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Show that the possible value of j, the total angular momentum resulting from the addition of two angular momentum j_1, j_2 are

$(j_1 + j_2), (j_1 + j_2 - 1), \ldots |j_1 - j_2|$.

Or

(b) For the Pauli's spin matrices, prove that :

(i) $[\sigma_x, \sigma_y] = 2i\sigma_2$ and

(ii) $\sigma_x^2 = \sigma_y^2 = \sigma_z^2 = 1$.

12. (a) Deduce Thomas Fermi equation by applying the concept of phase space.

Or

(b) Write short note son symmetric and antisymmetric wave functions and explain their construction.

13. (a) Obtain Dirac's relativistic equation for a free particle.

Or

(b) Discuss how the concept of spin angular momentum has evolved automatically from Dirac's Hamiltonian.

14. (a) List the elements of field quantisation for non relativistic field.

Or

(b) Explain the quantisation of Klein Gordan field.

15. (a) Write down the salient features of optical theorem.

Or

(b) Discuss briefly the theory of scattering by screened coulomb potential.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Evaluate the Clebsch Gordan coefficients for two spin ½ particles.

17. Discuss about the doublet separation and doublet intensity in the spectra of alkali atoms.

18. Derive Klein Gordan equation for a free particle and interpret how this equation is considered as a relativistic equation for a system of arbitrary number of particles and their antiparticles.

19. Explain how the quantization of non-relativistic fields represents both the system of bosons and fermions.

20. Explain the theory of quantizing an electromagnetic field.

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D–2279	Sub. Code
	34533

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2023.

Third Semester

MICROPROCESSOR AND ELECTRONIC INSTRUMENTATION

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. List the flags of 8085.
2. What are the modes in which 8086 can operate?
3. What is the instruction format of an 8085?
4. What is the size of 8051 instructions?
5. What is an interrupt?
6. What are the different types of ADC?
7. Define Resolution in D/A converter.
8. Give the type potentiometer.
9. Define transducers.
10. List out the features of miezo – electric transducer.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Draw the pin configuration of Intel 8085 with the pin assignments.

Or

(b) Draw the pin configuration of Inter 8086 with pin assignment in minimum mode.

12. (a) Explain Hardware interrupts of an 8085.

Or

(b) List out the Data Transfer Instruction sets of 8051.

13. (a) List the features of programmable interrupt controller 8259.

Or

(b) Give the pin description of communication interface 8251.

14. (a) Explain the working principle of sample and gold circuit.

Or

(b) Write a note on successive approximation method.

15. (a) Discuss about capacitive displacement transducer.

Or

(b) Explain the working principle of photovoltaic cell.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. With a neat block diagram explain the architecture of Intel 8085.

17. List out the software development tools and explain it.

18. Explain the following :

    (a) Non-inverting comparator.

    (b) Resistor ladder network method of DAC.

19. With neat diagram describe the functional block diagram of 8257.

20. Discuss the following :

    (a) Resistive strain gauges

    (b) LUDT-transducers.

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	34541

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2023.

Fourth Semester

CONDENSED MATTER PHYSICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. What are Crystalline solids?
2. Define unit cell with schematic diagram.
3. What is Simple Cubic (SC) structure? Give an example.
4. What is called lattice vibrations?
5. Define electrical properties of metals.
6. What is fermi energy?
7. List out the classification of semiconductors.
8. Define the term “Ferromagnetism”.
9. Differentiate hard and soft magnetic materials.
10. What is isotope effect?

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) What is translational and orientation order? Define the term space lattice and crystal system parameters with detailed examples.

Or

(b) Define crystal lattice. Explain types of lattices with proper examples and schematic diagram.

12. (a) Define lattice vibrations. Give the expression for diatomic lattice vibrations.

Or

(b) Derive an expression for free electron gas in three dimensions.

13. (a) What is called polarization? Derive an expression for clusius – Mosotu relation.

Or

(b) Give a detailed explanation of piezo electric crystaks and their electronic properties.

14. (a) Elucidate Neels theory of antiferromagnetism.

Or

(b) What is called spin waves? Differentiate the properties of hard and soft magnetic materials.

15. (a) Define Meissner effect with proper explanation. Write down its consequences.

Or

(b) Derive the char expression of BCS theory. Write a note on high temperature superconductors with examples.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Define crystal lattice and crystal structure. Name the symmetry elements with explanation. What is Bravais lattice and illustrate all the crystal systems with examples?

17. Explain types of lattices with examples. Define Miller indices and reciprocal lattice. Briefly describe bonding in solids.

18. Define Fermi energy. Derive a complete expression of Hall effect and its applications.

19. Write down the classification of magnetic materials with two examples for each type. Derive Langevin's theory of para magnetism.

20. Derive London Equations with suitable diagram. Write down the explanation of penetration depth and coherence length.

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D–2281

Sub. Code
34542

DISTANCE EDUCATION

M.Sc.(Physics) EXAMINATION, DECEMBER 2023.

Forth Semester

NUCLEAR AND PARTICLE PHYSICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. What do you meant by Gamma decay?

2. Write down short form of $\beta-$ decay.

3. What is collective model?

4. Define magic number.

5. Define direct nuclear reaction with example.

6. What you meant by normalization of deuteron wave functions.

7. State Yukawa's meson theory.

8. What is stellar energy?

9. State any two quantum numbers from particle directory.

10. Define charge conjugation and parity.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL the questions, choosing either (a) or (b).

11. (a) Describe in detail internal conversion.

Or

(b) With neat illustration give Fermi's theory of beta decay.

12. (a) Briefly explain the electric quadrupole moment .

Or

(b) Describe in detail magnetic moments of the shell model.

13. (a) Describe in short; Simple theory of deuteron.

Or

(b) How will you measure the phase shift using methods of partial wave analysis technique.

14. (a) Write a short note on thermal neutrons.

Or

(b) Write a Short note on controlled thermo nuclear reactions.

15. (a) Discuss in short SU(2) and SU(3) groups.

Or

(b) Write a short note on parity non-conservation in weak interaction.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Discuss in detail measurement of neutrino helicity.

17. Discuss in detail angular momentum of nucleus in ground state.

18. Explain in detail.

    (a) Resonance scattering across section and

    (b) Tensor force in nuclear mechanism.

19. Write a short note on.

    (a) Sub-nuclear particle.

    (b) CPT – invariance.

    (c) Rotational in space.

20. With near illustration and mechanism, explain in detail Bohr Wheeler theory.

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D–2282

Sub. Code
34543

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2023.

Fourth Semester

MATERIALS SCIENCE

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. What is meant by elastic behaviour?

2. Define condensation polymerization.

3. What are the main parts of vacuum pump?

4. Write short note on lattice misfit.

5. Explain Q-Switching.

6. Define: Optical Kerr effect.

7. What are photo refractive materials.

8. Discuss the novality of SMART materials.

9. Write short note on polymer matrix composites.

10. Distinguished between amorphous and crystalline materials.

PART B — ($5 \times 5 = 25$ marks)

Answer ALL the questions, choosing either (a) or (b).

11. (a) List the preventive measure to be taken to avoid corrosion of materials.

Or

(b) Distinguish between addition and condensation polymerization.

12. (a) Explain the working of turbo molecular pump.

Or

(b) How do thin films are produced by thermal evaporation method.

13. (a) Explain the working principle of any four level laser with neat diagram.

Or

(b) Write short note on second harmonic generators.

14. (a) Explain the structure of amorphous materials.

Or

(b) List some of the environmental applications of composite materials.

15. (a) Give the material characteristics of Nitinol.

Or

(b) Discuss briefly about MEMS.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Discuss in detail about the elastic inelastic and viscoelastic behaviour of materials.

17. State and derive the equation for kinetic theory of gases.

18. Explain about the working principle of Nd: YAG laser.

19. How do you classify polymer composites? Explain with suitable examples.

20. Discuss the fabrication process for synthesizing piezoelectric and piezo-resistive MEMS materials.

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