D–1506	Sub. Code
	34511

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2025.

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 cyclic coordinates.

2. What is virtual work?

3. Define Newton's law of motion.

4. State Phase-Space.

5. Define moment of inertia.

6. Prove $\{q_i, q_j\} = 0$.

7. What is length contraction?

8. How Lorentz transformation equation are superior than Galilean transformations?

9. What is meant by normal coordinates?

10. Write a short note on stable, unstable equilibrium.

PART B — (5 × 5 = 25 marks)

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

11. (a) State conservative and non-conservative system with an example.

Or

(b) Obtain the Lagrangian's equation of motion using Routhian function.

12. (a) State constraints. Classify the dynamical system based on constraints.

Or

(b) Write a note on stability of an orbit.

13. (a) State and prove Liouville's theorem.

Or

(b) Deduce time independent Hamilton – Jacobi equation.

14. (a) What do you mean by inertia tensor? Explain what do you understand by principal axes and principal moment of inertia.

Or

(b) Obtain an expression for addition of velocities using Lorentz transformation equation.

15. (a) Write the secular equation and eign value equation for small oscillation.

Or

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

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. State and deduce Kepler's law of planetary motion.

17. Derive Hamilton's canonical equation.

18. Discuss the theory on Eulerian angles.

19. Derive Lorentz transformation equation.

20. Discuss the theory on vibration of a linear triatomic molecule.

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D–1507	Sub. Code
	34512

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2025.

First Semester

MATHEMATICAL PHYSICS – I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Find the constant p for which $\vec{A}\times\vec{B}=\vec{C}$, where $\vec{A}=\vec{i}+2\vec{k}$; $\vec{B}=\vec{i}+p\vec{j}-\vec{k}$ and $\vec{C}=-2\vec{i}+3\vec{j}+\vec{k}$.

2. Define the gradient of a scalar function.

3. If $\hat{i},\hat{j},\hat{k}$ are three mutually perpendicular unit vectors, then $\hat{i}\times\hat{i}=$ ————, $\hat{i}\times\hat{j}=$ ————, $\hat{j}\times\hat{k}=$ ———— and $\hat{k}\times\hat{i}=$ ————.

4. What is orthogonal matrix?

5. Find the determinant of a matrix $\begin{bmatrix}4 & 6\\ 3 & 8\end{bmatrix}$.

6. Prove that the matrix $A=\begin{bmatrix}4 & 2\\ 6 & 3\end{bmatrix}$ is singular matrix or not.

7. Define gamma function.

8. Show that $\beta_{(m+1),n} = \frac{m}{m+n}.\beta_{m,n}$.

9. What is the Laplace transform of derivative of $f(t)$?

10. Fourier sine integral for $f(x)$ is ————————

PART B — (5 × 5 = 25 marks)

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

11. (a) If $\vec{a},\vec{b},\vec{c}$ be three vectors, then prove that $\vec{a}.(\vec{b}\times\vec{c}) = \vec{b}.(\vec{c}\times\vec{a}) = \vec{c}.(\vec{a}\times\vec{b})$.

Or

(b) If $\phi = 2x^3y^2z^4$ then find $div(grad\phi)$.

12. (a) Derive the Poisson's equation.

Or

(b) Obtain the relation for curl in orthogonal curvilinear coordinate system.

13. (a) Verify that $A = \frac{1}{3}\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{bmatrix}$ is orthogonal.

Or

(b) Find the eigen values of the matrix $A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$.

14. (a) Derive the relation between gamma function and beta function.

Or

(b) Derive the generating function of Legendre's differentiate equation.

15. (a) Find the Fourier transform of $f(x) = \begin{cases} 1 & \text{for } |x| < a \\ 0 & \text{for } |x| > a \end{cases}$.

Or

(b) Prove that $L[f'(t)] = SL[f(t)] - f(0)$.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. State and prove Gauss's divergence theorem.

17. Derive the expression for gradient, divergence and curl in spherical polar coordinates.

18. Let $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ find matrix P such that $P^{-1}AP$ is diagonal matrix.

19. Find the general solution for Hermite's differential equation.

20. By finding the Fourier transform of $f(x) = e^{-a^2x^2}, a > 0$, show that the transform of $e^{x^2/2}$ is $e^{x^2/2}$.

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D–1508

Sub. Code
34513

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2025.

First Semester

LINEAR AND INTEGRATED ELECTRONICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define PN junction.

2. What is forward bias of a diode?

3. Define operating point.

4. What is JFET?

5. Define Oscillation

6. What is current input bias current?

7. Define comparator.

8. What is the frequency of oscillators for a colpitt's oscillator is determined by the resonant frequency of the LC tank circuit?

9. Define active filetrs.

10. Differentiate oscillator from amplifier.

PART B — (5 × 5 = 25 marks)

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

11. (a) Explain the characteristics of forward and reverse bias of a diode.

Or

(b) Write a short note on Tunnel diode.

12. (a) Define transistor connection and explain cc configurations.

Or

(b) Briefly explain biasing and stabilization of a transistor.

13. (a) Define opto electronic devices and write a short note on photo detectors.

Or

(b) Discuss briefly about Hartley oscillator.

14. (a) Write a short note on differentiator.

Or

(b) Write a short note on Integrator.

15. (a) Describe the following:

(i) Input offset voltage

(ii) Output offset voltage

(iii) Differential input resistance

Or

(b) Briefly explain first order high pass filters.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Write a note on zener diode as voltage regulator with required diagrams.

17. Give detailed explanation of CE configuration of a transistor.

18. Discuss the construction and working of TRAIC with its I/O characteristics.

19. What are the sinusoidal oscillators? Explain in detail about Colpitt's oscillator.

20. Discuss any four electrical parameters of OP-AMP.

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D–1509	Sub. Code
	34521

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2025.

Second Semester

QUANTUM MECHANICS – I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Write down the Hamiltonian operator associated with observables in quantum mechanics.

2. Can we write the uncertainty relation with two position variables? Justify.

3. Define tunnel effect.

4. What is meant by zero print energy?

5. Write down the allowed energy eigen value of a rigid rotation.

6. Express Rayleigh ratio.

7. What do you mean by perturbation? Give the first order correction to the n^{th} energy eigen value.

8. Explain classical turning point.

9. What are the conditions for stimulated emission to occur?

10. Define scattering cross section.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Obtain the relation between particle and wave characteristics of a photon. Find the de Broglie wavelength of an electron moving with a speed 2×10^6 ms^{-1}. (Given m = 9.1×10^{-31}kg)

Or

(b) Derive time dependent Schrodinger equation. using this, obtain time independent Schrodinger equation.

12. (a) Obtain the ground state energy of a linear harmonic oscillator of angular frequency w.

Or

(b) Arrive at R, θ, Φ equations using separation of variables for a Hydrogen atom.

13. (a) Explain the interaction picture of representing dynamical variables.

Or

(b) Write short notes on Dirac's bra-ket notation.

14. (a) Discuss the first order time independent perturbtion theory for degenerate case.

Or

(b) Discuss the validity of WKB approximation.

15. (a) Explain the application WKB method to bound states.

Or

(b) Discuss the quantum mechanical treatment of theory of radiation.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Describe in brief all the postulates of quantum mechanics.

17. Derive the expression for energy eigen value and eigen function for a particle in a box.

18. Explain in detail, how the degenerate energy levels of hydrogen atom are split by the application of an electric field.

19. Discuss the theory of scattering using the Born approximation.

20. Illustrate with the necessary equations, the scattering by a central potential: Partial wave analysis.

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D–1510

Sub. Code
34522

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2025.

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 the questions.

1. What is analytic function?

2. Define Cauchy's integral theorem.

3. Find the singularity of the function $\frac{1}{(Z-2)(Z-4)^2}$.

4. What is the use of Green's function?

5. Write the Poisson equation.

6. What is symmetric tensor?

7. What is contraction of a tensor?

8. Define first order tensor.

9. What is abelian group?

10. Define experimental probability.

PART B — (5 × 5 = 25 marks)

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

11. (a) Explain conformal mapping.

Or

(b) Find the order of each pole and residue at it of $\frac{1-2z}{z(z-1)(z-2)}$.

12. (a) Derive the Cauchy's integral formula.

Or

(b) Find the residue of $f(z)=\frac{ze^{z}}{(z-a)^{3}}$ at its pole.

13. (a) Obtain the expression for two dimensional heat flow equation.

Or

(b) Derive the strum Liouville equation.

14. (a) Discuss the inner product of tensors with example.

Or

(b) Prove that Kronecker delta S_q^p is mixed tensor of rank 2.

15. (a) Write a note on reducible and irreducible representations.

Or

(b) Explain probability distribution with example.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Elaborately discuss Cauchy – Riemann conditions.

17. Evaluate the following integral using residue theorem $\int_C \frac{4-3z}{z(z-1)(z-2)}dz$ where C is the circle $|z| = \frac{3}{2}$.

18. Derive the equation of vibrating membrane.

19. State and prove quotient law of tensor.

20. Discuss about the homomorphism and isomorphism.

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D–1511	Sub. Code
	34523

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2025.

Second Semester

ELECTROMAGNETIC THEORY

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Write the continuity equation.

2. State Biot-Savart law.

3. Give the boundary conditions at the surface of the interface of two dielectric media.

4. Define degree of polarization.

5. What is dispersion? Classify it.

6. What is the reason of the appearance of blue color of sky?

7. Define total scattering cross section.

8. State the principle of wave guides.

9. Brief pinch effect.

10. What is Lienard-Wiechert potential?

PART B — (5 × 5 = 25 marks)

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

11. (a) Obtain Poynting theorem.

Or

(b) Arrive an equation for the penetration depth for the propagation of e.m.waves in a conducting medium.

12. (a) Deduce the boundary conditions at the surface of discontinuity of two dielectric media.

Or

(b) Explain the Brewster's angle and obtain the relation for Brewster's law.

13. (a) Deduce the differential and total scattering cross sections.

Or

(b) Explain the experimental demonstration of Anomalous dispersion in gases.

14. (a) Explain the magnetic confinement and pinch effect.

Or

(b) What are the conditions for the plasma existence?

15. (a) Explain the radiation from the moving charges.

Or

(b) Describe the reflection and transmission co-efficients of electromagnetic waves at the interference of two dielectric.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the propagation of electromagnetic waves in free space. Obtain the time average value of poynting vector in this case.

17. Describe the reflection and refraction of electromagnetic waves at the interface of two dielectric media. Obtain the Fresnel's equations when E is perpendicular and parallel to the plane of incidence.

18. Give the Lorentz assumptions while proposing the theory of dispersion in gases. Obtain the Lorentz relation for normal anomalous dispersion.

19. Explain the magnetohydrodynamics in detail.

20. Describe the charged particles in uniform constant electric field and in homogeneous magnetic fields.

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D–1512	Sub. Code
	34531

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2025.

Third Semester

MOLECULAR SPECTROSCOPY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. State hybridization.

2. What is isotopic substitution?

3. Define stark effect.

4. Write a note on dissociation energy.

5. Define Franck – Condon principle.

6. State hyper Raman effect.

7. Why anti-stokes lines are less intense than stokes lines?

8. What is meant by chemical shift?

9. State Mossbauer effect.

10. Write the principle of electron spin resonance.

PART B — (5 × 5 = 25 marks)

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

11. (a) Explain SP^2 hybridization with suitable example.

Or

(b) Describe the energy changes involved in a covalent bond formation on the basis of valence bond theory.

12. (a) How do you estimate the structure of the molecule using Raman spectroscopy?

Or

(b) What is a rigid rotator? How does it account for rotational spectroscopy?

13. (a) Explain the vibrational course structure of the electronic bond.

Or

(b) What is portreit parabola? Explain.

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

Or

(b) Give a detailed account on principle and instrumentation of coherent anti-stokes Raman scattering with block diagram.

15. (a) Explain in detail the determination of crystal symmetry using Mossbauer spectroscopy.

Or

(b) Write a detailed note on interaction between spin and magnetic field.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain indetail about the molecular orbital theory.

17. Give an expression for vibrational spectra of polyatonic molecule with example.

18. What is multiphoton absorption? Explain with example of two photon absorption process.

19. Describe in detail the principle, working and applications of X-ray photo electron spectroscopy.

20. Discuss the principle of NMR spectroscopy and explain spin-lattice interaction in it.

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D–1513	Sub. Code
	34532

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2025.

Third Semester

QUANTUM MECHANICS — II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Evaluate $[J_x, J_-]$.

2. Show that Pauli spin matrices anticommutes with each other.

3. What is central field approximation?

4. Write the disadvantge of Hartree self consistent method.

5. What are optical electrons and optical spectrum?

6. For what type of particles, Klein Gordon and Dirac equations are applicable?

7. Define second quantisation.

8. Write the relativistic energy of a free particle.

9. Explain Ramsaur Townsend effect.

10. What are partial waves? When do you call a scattering event as p-wave scattering?

PART B — (5 × 5 = 25 marks)

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

11. (a) Derive commutation relations among J_z, J_+ and J_-.

Or

(b) Discuss about addition of angular momenta. What are CG coefficients? Obtain an expression for it.

12. (a) Discuss the salient features of the Thomas Fermi model of a atom.

Or

(b) Explain the construction of symmetric and antisymmetric wavefunctions for a two and three particle systems.

13. (a) Describe the classification of elements in the periodic table.

Or

(b) Arrive at Dirac's relativistic equation for a free particle and express its covariant form.

14. (a) Discuss about the elements of field quantisation.

Or

(b) Explain how the quantisation of non relativistic field represent a system of bosons.

15. (a) Give a brief account of quantisation of relativistic Klein Gordon field.

Or

(b) Briefly explain about the scattering by screened Coulomb potential.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss the matrix representation of angular momentum operators and obtain matrices for J_x, J_y, J_z and J^2 for $j = 0, 1/2$ and 1.

17. Describe in detail about Hartree Fock method.

18. Obtain the plane wave solution for the Dirac Hamiltonian and analyse the important aspects of negative energy spectrum.

19. Quantize the electromagnetic field and obtain photon as its quanta.

20. Obtain the expression for scattering amplitude in partial wave analysis.

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	34533

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2025.

Third Semester

MICROPROCESSOR AND ELECTRONIC INSTRUMENTATION

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Name any four general-purpose registers in 8086.

2. Define the term instruction cycle.

3. List any two types of addressing modes in 8085.

4. Name any two arithmetic instructions in 8085.

5. What is memory-mapped I/O?

6. What is the role of the DAC in a control system?

7. Classify transducers based on the principle of operation.

8. What is the difference between photovoltaic and photoconductive transducers?

9. Define branching. Name any two branch instructions.

10. Mention any two software development tools for 8085.

PART B — (5 × 5 = 25 marks)

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

11. (a) Explain the architecture of 8086 briefly.

Or

(b) Describe the opcode fetch cycle with a timing diagram.

12. (a) Compare microprocessor and microcontroller.

Or

(b) Write an assembly program using subroutines.

13. (a) Draw the block diagram of 8255 and explain it.

Or

(b) What are the different applications of microprocessor in instrumentation?

14. (a) Explain chemical thermometry and where it is used.

Or

(b) Differentiate between DAC and ADC.

15. (a) Describe the basic memory interfacing technique with a block diagram.

Or

(b) Explain the concept of stack and stack pointer in 8085.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the architecture of 8086 Microproccesor with a neat block diagram.

17. Write a program for traffic light control system using 8085 and explain with a flowchart.

18. Discuss in detail memory-mapped and I/O-mapped I/O, and explain with examples and diagrams.

19. Describe in detail the successive approximation method of A/D conversion with timing diagram.

20. Discuss branching and looping in 8085. Write a program using conditional jumps.

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D–1515	Sub. Code
	34541

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2025.

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 the questions.

1. Define crystalline solids and mention its types.

2. Define space lattice.

3. Explain the role of phonons in lattice vibration of a crystalline solid.

4. Define dielectric constant and its significance. Give some examples of it.

5. What is paramagnetism and mention its properties?

6. Explain Neel's temperature and how it relates with anti-ferromagnetic materials?

7. What is meant by quantization of spin waves?

8. What is isotope effect and give examples of it?

9. Define coherence length.

10. State Meissner effect.

PART B — (5 × 5 = 25 marks)

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

11. (a) Define rotational order phase of matter and explain how does the rotational symmetry distinguish the crystal, quasi crystal and liquid crystal?

Or

(b) What is Wigner – Seitz cell? How it is constructed in a 2D lattice.

12. (a) State Hall effect. Derive the expression for Hall voltage in a conductor placed in a magnetic field.

Or

(b) Explain the band theory of solids. How does it distinguish between conductors, semi-conductors and insulators?

13. (a) Differentiate between electronic, ionic and orientational polarizability.

Or

(b) Classify magnetic materials based on their magnetic behaviour with one example.

14. (a) Explain the concept of magnetic hysteresis and how it differs between hand and soft magnetic materials?

Or

(b) What is ferromagnetism and explain the concept and its key characteristics?

15. (a) What is isotope effect in superconductivity? Explain the relation between critical temperature and isotopic mass in BCs theory.

Or

(b) Describe the formation of cooper pairs and how they lead to zero electrical resistance in BCs theory.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. What is Bravais lattice? Explain their classification based on crystal systems with neat diagrams.

17. Describe the atomic amangements in SC, BCC and FCC lattices. Compare them based on co-ordination number, atomic packing factor and density with suitable diagrams.

18. What is Kronig – penny model? Explain how its leads to the formation of energy bands and band gaps in solids.

19. Explain the concept of magnetic susceptibility using quantum theory of paramagnetism. Derive its temperature dependence and show how it lead to Curie's law.

20. State and derive London equations. How to they explain perfect diamagnetism in super conductors?

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D–1516

Sub. Code
34542

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2025.

Fourth Semester

NUCLEAR AND PARTICLE PHYSICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. Define magic numbers.

2. Write the selection rules for β – decay.

3. What is neutrino?

4. What are tensor forces?

5. State nuclear fusion.

6. What is meant by critical size?

7. Define scattering cross section.

8. What is parity?

9. Write a short note on quarks.

10. State CPT theorem.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) How is internal conversion coefficient of gamma rays obtained? Explain with necessary theory.

Or

(b) Briefly explain the electric quadrupole moment.

12. (a) Give an account on the single particle model of the nucleus.

Or

(b) Explain how spin-orbit coupling can be accounted on the basis of shell model.

13. (a) Obtain an expression for the scattering cross section for low energy n-p scattering.

Or

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

14. (a) Discuss in detail note on controlled thermo nuclear reactions.

Or

(b) Describe the sources of Stellar Energy.

15. (a) Classify the fundamental forces.

Or

(b) Give the theory of eight fold way SU(3) symmetry.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Give the Fermi's theory of β – decay.

17. Describe Yukawa's meson theory of nuclear force.

18. Explain in detail :

    (a) Resonance scattering cross section

    (b) Tensor force in nuclear mechanism.

19. Explain neutron cycle in a nuclear reactor. Derive four factor formula.

20. Derive the relation of relativistic kinetics of elementary particles.

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D–1517

Sub. Code
34543

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2025.

MATERIAL SCIENCE

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define plastic deformation.

2. What are polymers and its types?

3. What is oxidation corrosion of metals?

4. Define Pirani gauge.

5. What do you mean by thin and thick film?

6. Define Liquid phase epitaxy?

7. What are the basic principles involved in the LASER?

8. What is the Pokel's effect?

9. Define Pseudo elasticity.

10. Why silicon oxide materials used in MEMS?

PART B — (5 × 5 = 25 marks)

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

11. (a) Distinguish elastic, inelastic and visco elastic materials.

Or

(b) Explain the Pirani and Penning Gauges with neat diagram.

12. (a) Explain in short molecular beam epitaxy.

Or

(b) With neat Illustration give any two applications of LASER.

13. (a) Explain the second harmonic generation in Non-linear optics.

Or

(b) Elaborate the significance of carbon matrix and metal-matrix composite materials.

14. (a) Distinguish the crystalline and amorphous solid.

Or

(b) Write a short note how the carbon does based materials involved in electrochemical applications.

15. (a) Enumerate are the general properties of shape memory alloys.

Or

(b) Give an outline about the micro-actuator and micro-accelerometer.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss in detail the mechanical behaviour of polymers.

17. Elaborate the physical vapour depositior technique with a neat sketch.

18. Explain the population inversion in 3-level and 4-level laser system with energy level diagram.

19. Discuss the composite materials for the environmental and biomedical applications.

20. Give a detailed account on fabrication of Piezoelectric and Piezo-resistive MEMS materials.

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