D–6538

Sub. Code
34511

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2024.

First Semester

CLASSICAL MECHANICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. State Kepler's second and third law of motion.

2. List different kinds of constraints with one example each.

3. What do you meant by degrees of freedom?

4. Define phase-space.

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

6. Define moment of inertia.

7. Write the two postulates of special theory of relativity.

8. How Lorentz transformations are superior than Galilean transformation?

9. What are normal coordinates and normal frequencies?

10. What are coupled oscillators?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Describe the principle of virtual work.

Or

(b) Derive Hamilton's principle for a conservative system.

12. (a) Define Routhian function. Derive the Lagrenge's equation of motion using Routhian function.

Or

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

13. (a) Obtain the period of oscillation for compound pendulum.

Or

(b) Estimate the moment of inertia of a body about any line through the origin of coordinates frame.

14. (a) What is length contraction? Explain.

Or

(b) Derive Lorentz transformation equations.

15. (a) Discuss different types of equilibria with illustration.

Or

(b) Write the secular equation and eigen value equation for small oscillation.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

17. State and prove Liouville's theorem.

18. Derive the kinetic energy of a rigid body rotating about a fixed point.

19. Derive Einstein's mass – energy relation.

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

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D–6539

Sub. Code
34512

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2024.

First Semester

MATHEMATICAL PHYSICS - I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

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

2. What is vector point function?

3. Define symmetric matrix with example.

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

5. Matrices A and B are such that $3A - 2B = \begin{bmatrix} 2 & 1 \\ -2 & -1 \end{bmatrix}$, find A and B.

6. What is gamma function?

7. Half order Bessel's functions $J_{-3/2}(x) =$ ————.

8. Using Rodrigue's formula, prove that $\int_{-1}^{+1} P_0(x)dx = 2$.

9. Find the Fourier cosine transform of $f(x) = e^{-ax}$.

10. If $L\{f(t)\} = F(s)$, then $L\{f(at)\}$ = ————————.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) State and prove Gauss's theorem.

Or

(b) If $\phi = 3x^2y - y^3z^2$, find $grad\phi$ at the point (1, –2, –1).

12. (a) For which value of 'b' the ranic of the matrix $A = \begin{bmatrix} 1 & 5 & 4 \\ 0 & 3 & 2 \\ b & 13 & 10 \end{bmatrix}$ is 2.

Or

(b) Obtain the eigen values and the corresponding egien vectors for the following matrix $\begin{bmatrix} 4 & 2 & -2 \\ -5 & 3 & 2 \\ -2 & 4 & 1 \end{bmatrix}$.

13. (a) If 'a' and 'b' are the different roots of $J_n(\mu P) = 0$, then show that $\int_0^p J_n(ar)J_n(b)rdr = 0$.

Or

(b) Prove that $\beta_{(m,n)} = \frac{\lceil m \ \lceil n}{\lceil m+n}$.

14. (a) Derive the generating function of Laguerre differential equation.

Or

(b) Show that $\int_{-\infty}^{\infty} e^{-x^2} H_n(x) H_m(x) dx = 2^n n! \sqrt{\pi}$

Where $\delta_{mn} = 0$ for $m \neq n$

$\delta_{mn} = 1$ for $m = n$.

15. (a) Find the Laplace transform of $f(t) = \sinh at \sin at$.

Or

(b) Find Fourier sine transform of $\frac{1}{x}$.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Derive the grad, div and curl for orthogonal coordinate system.

17. 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.

18. Obtain the find solution of Legendre's polynomial.

19. Solve the Bessel's differential equation and deduce its final solution.

20. Find the Laplace transform of the function

$$F(t) = \begin{cases} 1, & 0 \leq t \leq 1 \\ t, & 1 \leq t < 2 \cdot \\ t^2, & 2 \leq t < \infty \end{cases}$$

D–6540

Sub. Code
34513

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2024.

First Semester

LINEAR AND INTEGRATED ELECTRONICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. What is the basic concept of semiconductor?

2. What is the forward characteristics of zener diode?

3. Which diode is used for rectifier?

4. What are the methods of transistor biasing?

5. Give the disadvantages of pash-full amplifier.

6. What is differences between oscillator and amplifier?

7. Why FET is used as switch?

8. What is slew rate and its effect?

9. Describe low pass filter and its types.

10. What is the need of negative feedback in an op-amp?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Explain intrinsic and extrinsic semiconductor and differentiate them.

Or

(b) Explain the function of zener diode used as a voltage regulator.

12. (a) Draw the common emitter connection of transistor and give its characteristics.

Or

(b) Explain voltage divides bias circuit with neat circuit diagram.

13. (a) What is FET and its types? What is the function of FET transistor?

Or

(b) Explain the Colpitt's oscillator.

14. (a) Discuss about the band pass filter.

Or

(b) Explain in detail about operational amplifier.

15. (a) Describe the push pull amplifier.

Or

(b) Discuss about the any two parameters of op-amp.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Explain the non-ideal DC characteristics of an operational amplifier.

17. Discuss about the schottky and bunnel diode.

18. Briefly explain the transistor audio power amplifer.

19. Discuss about the filed effect transistor in detail with necessary diagram.

20. Explain the active fileters.

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D–6541	Sub. Code
	34521

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2024.

Second Semester

QUANTUM MECHANICS — I

(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 expectation value and write down its importance.

2. Express de Broglie wavelength and give its significance.

3. Show that the probability density is independent of time.

4. What are raising and lowering operators?

5. Write down the R, $\otimes$, Φ equations of a Hydrogen atom.

6. What are the classes of representations of wave functions and observable?

7. Define spherically symmetric potential.

8. State the significance of perturbation theory.

9. Define classical turning point.

10. Explain the validity of WKB approximation.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) An electron has a speed of 2×10^2 m/s accurate to 0.01% with what accuracy can we locate the position of the electron. Given m = 9.1×10^{-31} kg, h = 6.62 10^{-34} Js.

Or

(b) Derive the energy eigen value of linear harmonic oscillator.

12. (a) What is quantum mechanical tunneling? If the energy E of the incident particle is lesser than V_0, then calculate the coefficient of reflection and transmission.

Or

(b) Write the theory of free particle in one dimensional motion.

13. (a) Write short notes on Dirac's bra and ket notation list some of their properties.

Or

(b) Derive the eigen value equation for a rigid rotator.

14. (a) Derive first order time independent perturbation theory for degenerate level.

Or

(b) Using variational principle, obtain the ground state of Helium atom.

15. (a) Describe the theory behind bound states and parity.

Or

(b) Write short notes on selection rules based on dipole approximation.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. State and explain the postulates of quantum mechanics.

17. Derive time independent and time dependent schrodinger wave equation.

18. Using the perturbation theory, discuss the effect of electric field on the energy levels of the hydrogen atom.

19. Develop the theory of WKB approximation and also obtain its connection formulae.

20. Discuss :

    (a) Schrodinger picture and

    (b) Heisenberg picture for describing the dynamic behaviour of a system.

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D–6542

Sub. Code
34522

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2024.

Second Semester

MATHEMATICAL PHYSICS – II

(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 mapping.

2. What are poles of the function $f(z) = \frac{1}{(z-2)^3(z-4)}$ and mention the order of poles?

3. Write the Laplace equation.

4. Write a note on Hermitian operators.

5. Define skew symmetric tensor.

6. What is first order tensor?

7. Define cyclic group.

8. Write the expression for binomial distribution.

9. What is zeroth order tensor?

10. What is experimental probability?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Find the residue of $\frac{1}{z(z-1)}$.

Or

(b) Write a note on conformal mapping.

12. (a) Derive the Cauchy – Riemann conditions.

Or

(b) Write a note Green's function.

13. (a) Derive the one dimensional heat flow equation.

Or

(b) Applying the method of separation of variable technique, find the solution to $3\frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0$.

14. (a) Prove that every second order tensor can be expressed as the sum of a symmetric and a skew-symmetric tensor.

Or

(b) If $a_{ijk....}, b_{ijk...}$ are two tensors of the same order then $c_{ijk...} = a_{ijk...} + b_{ijk...}$ is a tensor of same order.

15. (a) Mention the properties of homomorphism.

Or

(b) Write a note on central limit theorem.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

17. Derive the wave equation for vibrating membrane.

18. Find an orthonormal basis for the vector space generated by the vector (1, 1, 0, 1), (1, –2, 0, 0) and (1, 0, –1, 2) using Gram – Schmidt orthogonalisation process.

19. State and prove the quotient law of tensors.

20. Construct the character table for C_{3v} point group.

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D–6543

Sub. Code
34523

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2024.

Second Semester

ELECTROMAGNETIC THEORY

(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 pointing theorem.

2. Explain the continuity equation.

3. Give Fresnel equations.

4. Write about the degree of polarization in Brewster's angle.

5. What is called Lorentz force?

6. What are wave guides?

7. Write down the uses of Gunn diode.

8. What are the types of resonance cavity?

9. Define magnetostatics.

10. What is pinch effect?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Explain the transverse nature of the electromagnetic waves.

Or

(b) Describe about the scalar and vector potential in wave equation.

12. (a) Explain the propagation of EM waves in conducting medium.

Or

(b) Explain the interface of non-conducting media int terms of reflection and refraction of EM waves.

13. (a) Derive Fresnel's equations.

Or

(b) Explain the total internal reflection.

14. (a) Describe the normal and anomalous dispersion.

Or

(b) Explain the polarization of scattered light.

15. (a) Describe about resonance cavity.

Or

(b) Deduce the equation for EM fields of uniformly moving point charge.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Explain the propagation of EM waves in free space and isotropic medium.

17. Deduce the equation for the Reflection and transmission coefficients for two dielectric media.

18. Explain the coherence and incoherence of scattered light.

19. What is magnetron? Explain its working.

20. Describe the charged particle in the uniform electric and magnetic field.

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D–6544

Sub. Code
34531

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2024.

Third Semester

MOLECULAR SPECTROSCOPY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. What is directed band?

2. Write the difference between Raman and FTIR spectra.

3. Define stark effect.

4. State normal modes of vibration.

5. What is predissociation?

6. Define mutual exclusion principle.

7. What is hyper Raman scattering?

8. Define population inversion.

9. What is the principle of nuclear quadrupole resonance?

10. Define Mossbauer effect.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) What is hybridization of orbitals? Give the necessary condition and characteristics of hybridization of atomic orbitals.

Or

(b) Give a brief account on quadrupole hyperfine interaction.

12. (a) Explain briefly the instrumentation of IR spectrometer with neat diagram.

Or

(b) How do you determine the structure of the molecule using IR spectroscopy?

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

Or

(b) What is dissociation energy? Arrive an expression for the maximum number of vibrational levels below the dissociation limit.

14. (a) Describe in detail the photo acoustic Raman scattering.

Or

(b) What is hyper Raman effect? Give the classical treatment of hyper Raman effect.

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

Or

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

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Describe the molecular orbital theory in detail.

17. What are symmetric top molecules and derive an expression for determination of rotational spectra in microwave spectroscopy.

18. Give an expression for vibrational spectra of polyatomic molecules with example.

19. Derive Bloch equation.

20. Describe in detail about the chemical shift in NMR spectroscopy.

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D–6545

Sub. Code
34532

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2024.

Third Semester

QUANTUM MECHANICS – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. List few communication relation between J^2 and J_+ and J_-.

2. What are Pauli spin matrices?

3. When a field is said to be self consistent?

4. Differentiate bosons and fermions.

5. Give the features of alkali spectra.

6. Define D. Alembertian operator.

7. Express the probability densities of relativistic mechanics.

8. Write down some properties of Dirac matrices.

9. Explain diffusion scattering.

10. What are partial waves?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Obtain the matrix representation of angular momentum operators J^2 and J_2.

Or

(b) Show that :

(i) $\left[L_x L_y, L_z\right] = i\hbar(Lx^2 - Ly^2)$

(ii) $L^2 = 2\hbar^2 I$.

12. (a) Write notes on addition of angular momenta.

Or

(b) Deduce Thomas Fermi equation.

13. (a) Discuss about symmetric and antisymmetric wave functions and explain their constructions.

Or

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

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

Or

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

15. (a) For a system of Fermions, define the number operator N_K and show its eigen values are 0 and 1.

Or

(b) Derive an expression for scattering amplitude using Born approximation.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Evaluate the Clebsch – Gordon coefficients for two spin – 1/2 particles.

17. Describe Hartree – Fock method of self consistent field theory.

18. Solve the Klein Gordon equation for plane waves and discuss its result in detail using hydrogen like atom.

19. Describe the quantisation of non relativistic Schrodinger equation.

20. Discuss briefly the theory of scattering by screened coulomb potential.

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D–6546	Sub. Code
	34533

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2024.

Third Semester

MICROPROCESSOR AND ELECTRONIC INSTRUMENTATION

(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 Op-code fetch.

2. List the components of the software development tool.

3. What is the meant by Stack operation?

4. Explain general purpose registers.

5. Define interrupts.

6. List the applications of microprocessor.

7. What is the purpose of comparator?

8. What are the classification of transducers?

9. Explain the principle of p-n junction diode.

10. Describe photovoltaic cell.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Write a note on addressing modes of 8085.

Or

(b) Explain the pin function of 8086 with a neat pin diagram.

12. (a) List the op-code for arithmetic instruction with a proper explanation.

Or

(b) Discuss about the interrupts service routines in 8085.

13. (a) What are the hardware features of 8051?

Or

(b) Elaborate the instructions sets of 8051.

14. (a) With a proper circuit discuss the Resistor ladder network method.

Or

(b) Write a short note on chemical thermometry.

15. (a) What is linear variable differential transformer transducer? Explain its working principle.

Or

(b) What is the basic working principle of piezoelectric transducers?

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Discuss the different mode operation of 8086.

17. Illustrate the architecture of 8051 with a proper diagram.

18. How microprocessor is used to monitor the temperature? Explain in detail.

19. Briefly write a note on programmable communication interface.

20. How displacement in measured using capacitive displacement transducer and potentiometer?

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D–6547

Sub. Code
34541

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2024.

Fourth Semester

CONDENSED MATTER 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. What is called primitive cell?

2. What is BCC? Give an example.

3. Define Wigner – Seitz cells.

4. What is called lattice vibrations?

5. What is phonon?

6. Write any two electrical properties of metals.

7. Define the term “polarization”.

8. What is called magnetic materials? Give its types.

9. Define ferrimagnetisms. What are the peculiar properties of ferrites?

10. Differentiate hard and soft magnetic materials.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) What are crystalline solids? Define the terms crystal lattice and structure. Write down the symmetry elements with explanation.

Or

(b) Write down a clear explanation of bonding in solids.

12. (a) Write down the derivation and applications of fermi energy. Derive an expression for Hall effect.

Or

(b) Elucidate the basic theory of solids. Discuss in brief about the fermi energies of impurity semiconductors.

13. (a) What is the effect of local electric field? Elucidate the Lorentz field with relativistic from of equations.

Or

(b) Define dielectric constant with its unit. Discuss in detail about the polarizability and its types with appropriate examples.

14. (a) What is paramagnetism? Derive an expression for Langerin's theory of paramagnetism.

Or

(b) Define the term "ferromagnetism". Write down the theory of Weiss molecular field.

15. (a) Write down the isotope effect in super conductors. Discuss in detail about Type I and II superconductors with four examples each.

Or

(b) Define tunneling effect with schematic diagram. Describe in brief about the Josephson effect in superconductors. Write down its importance.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Define crystalline solids with examples. Discuss in detail the symmetry elements of crystalline solids. Differentiate crystalline and amorphous solids with example.

17. Give a clear structure diagram of SC, BCC, FCC and HCP with the examples. What is called miller indices and write down its formula. Give the construction, rule and principles of miller Indices.

18. What is lattice vibrations? Derive the expression for diatomic lattice vibrations. What will be consequences of lattice vibrations of phonons?

19. What is called magnetic materials? Give the classifications of magnetic materials with its properties. Derive an expression for quantum theory of paramagnetism.

20. What is Meissner effect? Give detailed information on derivation, explanation and properties of diamagnetism. Differentiate type I and II superconductors with neat diagram.

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D–6548

Sub. Code
34542

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, DECEMBER 2024.

Fourth Semester

NUCLEAR AND PRACTICE 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 electric quadrupole moment.

2. State schmidt lines.

3. What are magic numbers?

4. What are the selection rules for beta decay?

5. What are tensor forces?

6. Define phase shift.

7. Write a note on sources of stellar energy.

8. State – critical size.

9. What is meant by parity?

10. Write Gell – Mann – Nishijima formula.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Describe the measurement of neutrino helicity.

Or

(b) What is nuclear isomerism of gamma rays? Explain.

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

Or

(b) What is gamma emission? And also discuss about the selection rules of gamma emission.

13. (a) Discuss the theory on nucleon – nucleon potential.

Or

(b) Explain how the deutron wave function is normalized?

14. (a) Discuss in detail about the controlled thermo nuclear reactions.

Or

(b) Explain the critical size of a nuclear reactor.

15. (a) Explain SU(3) symmetry groups.

Or

(b) State and explain CPT theorem.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

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

17. Give the theory of liquid – drop model of a nucleus and discuss it.

18. Discuss the theory on low energy n-p scattering.

19. Describe the various types of nuclear reactors.

20. Write an essay about the fundamental interactions.

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D–6549

Sub. Code
34543

DISTANCE EDUCATION

M.Sc.(Physics) DEGREE EXAMINATION, DECEMBER 2024.

Fourth Semester

MATERIALS SCIENCE

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

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

Answer ALL the questions.

1. Explain the mechanism of plastic deformation.

2. What is corrosion?

3. Explain the phenomena of gas transport.

4. What is Lattice misfit?

5. What is meant by population inversion in LASER?

6. Describe the acousto – optic effect.

7. Explain the benefits of polymer – matrix composites.

8. What is meant by amorphous materials?

9. Define memory alloys.

10. List the application of micro actuators.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Write a note on creep and fatigue of a material.

Or

(b) Explain the process of condensation polymerization.

12. (a) How to prevent corrosion and oxidation of metals?

Or

(b) Discuss the working principle of turbo molecular pumps.

13. (a) How to measure the thickness of the prepared thin films?

Or

(b) Discuss the process of mode locking in LASER.

14. (a) Write a short note on He-Ne laser.

Or

(b) Enlighten the application of composite materials in the field of biomedical.

15. (a) What nitinol? Explain its characteristics.

Or

(b) Discuss silicon oxide based micro mechanical systems.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. What is polymer? Discuss the different types of polymer in detail.

17. Discuss the working principle of Pirani and Penning Gauges.

18. Write a detailed note on pollution inversion in three level and four level system.

19. Elaborate the preparation methods of amorphous and glassy materials.

20. Outline the fabrication process of piezoelectric and piezo – resistive materials.

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