D–4542

Sub. Code
34511

DISTANCE EDUCATION

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

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 questions.

1. What is meant by constraints?

2. Explain the principle of least action.

3. State Newton's law of motion.

4. What is Lagrange bracket?

5. Using Poisson's bracket, prove Hamilton's equation of motion.

6. State the postulates of special theory of relativity.

7. What is meant by Galilean transformation?

8. Define normal modes.

9. Write a secular equation for small oscillations.

10. Explain – Neutral equilibrium.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Define Routhian function. Explain.

Or

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

12. (a) Derive Euler – Lagrangian equation.

Or

(b) Explain the properties of Lagrange bracket.

13. (a) Write a note on momental ellipsoid.

Or

(b) What is time-dilation? Explain.

14. (a) Discuss the theory on compound pendulum.

Or

(b) Deduce the expression for angular momentum of the rigid body.

15. (a) Write a short note on :

(i) Normal coordinates.

(ii) Normal modes.

Or

(b) Discuss the theory on two coupled oscillators.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Deduce the Kepler's laws of planetary motion.

17. Give an account of Hamilton – Jacobi theory and illustrate it by applying it to the problem of simple harmonic oscillator.

18. Explain in detail about the Eulerian angles.

19. Derive Einstein's Mass – Energy relation.

20. Describe the two coupled oscillators experiment. Obtain the equation of motion.

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D–4543

Sub. Code
34512

DISTANCE EDUCATION

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

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. Define vector point function.

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

3. Find the unit normal to the surface $x^2 + y^2 = z$ at a point (1, 2, 5).

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

5. Define singular matrix with example.

6. What is diagonal matrix? Give example.

7. Write a short note on beta function.

8. Prove that $\lceil n+1 = n!$

9. Write the Fourier sine and cosine integrals.

10. Show that $\lfloor (1) = \frac{1}{S}$.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Show that $\nabla \cdot (U + V) = div\, U + div\, V$.

Or

(b) Find the divergence and curl of

$\vec{V} = (x\, y\, z)\hat{i} + (3x^2 y)\hat{j} + (xz^2 - y^2 z)\hat{k}$ at $(2, -1, 1)$.

12. (a) Discuss about Gauss law.

Or

(b) Transform $\begin{bmatrix} 1 & 3 & 3 \\ 2 & 4 & 10 \\ 3 & 8 & 4 \end{bmatrix}$ into a unit matrix.

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

Or

(b) Derive the recurrence relations of Legendre's function.

14. (a) Discuss the orthogonality property of Bessel's function.

Or

(b) Deduce the generating function of Laguerre differential 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) Obtain the Laplace transform of $t^2 e^t \sin 4t$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. State and prove Stoke's theorem.

17. Obtain the vector differential operators for cylindrical coordinates.

18. Find the eigen values and eigen vectors of matrix

$$A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}.$$

19. Obtain the general solution of Hermite differential equation.

20. Find the Laplace transform of the function

$$f(t) = \begin{cases} \sin \omega t & \text{for} \quad 0 < t < \dfrac{\pi}{\omega} \\ 0 & \text{for} \quad \dfrac{\pi}{\omega} < t < \dfrac{2\pi}{\omega} \end{cases}.$$

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D–4544

Sub. Code
34513

DISTANCE EDUCATION

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

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 questions.

1. Give some important properties of semiconductors.
2. What is PN Junction?
3. What are the methods of transistor biasing?
4. Give the disadvantages of push-pull amplifier.
5. Write down the following terms are using in SCR.
6. What are the important semiconductor switching devices?
7. What is the need of negative feedback in an op-amp?
8. What do you mean by slew rate of op-am?
9. Draw the diagram of colpitt's oscillators.
10. What is stabilization?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Discuss the behaviour of an PN junction under forward and reverse biasing.

Or

(b) What is a LED? Explain the working principle and give two applications of LEDs.

12. (a) Discuss about the methods of transistor Biasing.

Or

(b) Write down the classification of power Amplifiers.

13. (a) Explain the construction and working principle of TRIAC.

Or

(b) Explain the types of field effect transistors.

14. (a) Discuss about the two parameters of Op-Amp.

Or

(b) Briefly explain the applications of Op-Amps.

15. (a) Explain the important terms are used in JFET circuit.

Or

(b) Write down the summing amplifiers.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Discuss about the working principle, construction and characteristics of zener diode. Explain the zener diode as a voltage regulator.

17. Explain the different types of transistor oscillators and discuss about the any three oscillators.

18. Explain the active filters.

19. Briefly explain the Transistor Audio Power Amplifier.

20. Explain the construction and working principle of JFET and MOSFET. Give the advantages of JFET.

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D–4545

Sub. Code
34521

DISTANCE EDUCATION

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

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. Define the expectation values of dynamical quantities.

2. List some limitations on wave function.

3. What is zero point energy?

4. Give the normalized wave function for hydrogen like atom.

5. Distinguish between raising and lowering operator.

6. How does a wave function represent a stationary state?

7. Write down the validity of WKB approximation.

8. Express the ground state energy of Deuteron.

9. Distinguish between Rayleigh and Raman scattering.

10. Define perturbed and unperturbed part of Hamiltonian.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) State Heisenberg Uncertainty principle. Explain any two applications of uncertainty relation.

Or

(b) Solve the time dependent Schrodinger wave equation.

12. (a) Find the eigen value and eigen function of a particle in one dimensional box.

Or

(b) Obtain the solution of linear harmonic oscillator quantum mechanically using matrix mechanics.

13. (a) Solve the Schrodinger equation of a rigid rotator and give their energy eigen values and eigen functions.

Or

(b) State and prove Erhenfest's theorem.

14. (a) Evaluate the first order energy correction and first order eigen function in perturbation theory.

Or

(b) Obtain the ground state energy of Helium using variational method.

15. (a) Discuss about first order time dependent perturbation theory and arrive at an expression for probability.

Or

(b) What are allowed and forbidden transitions? Give the selection rules based on dipole approximation.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Explain quantum mechanical tunneling. Obtain the transmission coefficient for the case $E < V_0$ using Schrodinger equation.

17. Derive the first order time independent perturbation equation for degenerate case.

18. Discuss about Schrodinger and Interaction picture of representing dynamical variables.

19. Explain Stark splitting of $n = 2$ level of the Hydrogen atom in presence of an electric field using time independent perturbation theory.

20. Derive the relation between Einstein's A and B coefficient for transition probability.

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D–4546

Sub. Code
34522

DISTANCE EDUCATION

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

Second Semester

MATHEMATICS 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 poles of the function $\frac{1}{(z-4)^2(z-3)}$.

2. What is the condition for conformal transformation?

3. What is the uses of Green's function?

4. Write the self adjoint partial differential equation.

5. What is Hermitian operator?

6. Define contravariant tensor with example.

7. If $A^{-p} = \frac{\partial x^{-p}}{\partial x^{\alpha}} A^{\alpha}$, prove that $A^{\alpha} = \frac{\partial x^{\alpha}}{\partial x^{-p}} A^{-p}$.

8. What is Cyclic group?

9. Mention about symmetry operators.

10. What is random variable?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Derive Cauchy-Riemann conditions.

Or

(b) State and prove Cauchy's fundamental theorem.

12. (a) Find the residue of a function $f(z) = \frac{z^2}{(x+1)^2(z-2)}$ at each of the poles.

Or

(b) Using method of separation of variable solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$, where $u(x,0) = 6e^{-3x}$.

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

Or

(b) Obtain the Sturm-Liouville equation.

14. (a) Prove that the inner product of tensors A_n^m and B_t^{rs} is a tensor of rank 3.

Or

(b) State and prove the orthogonality theorem.

15. (a) Discuss about the SO(2) and SO(3) rotation groups.

Or

(b) Describe the central limit theorem.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Derive the Laurent series.

17. Derive two dimensional wave equation for a vibrating rectangular membrane.

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

19. (a) Write a note on mixed tensor and metric tensor.

    (b) Show that the contracted tensor $A^{\gamma\sigma\rho}_{\lambda\mu\delta}$ is a mixed tensor of rank 4.

20. Elaborately discuss the reducible and irreducible representations.

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D–4547

Sub. Code
34523

DISTANCE EDUCATION

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

Second Semester

ELECTROMAGNETIC THEORY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. State Coulombs law.

2. Define magnetic moment.

3. Write all four Maxwell's equation.

4. State poynting theorem for an electromagnetic field.

5. Define total internal reflection.

6. What is meant by dielectrics?

7. What are the types of polarization?

8. State Brewster's law.

9. Define Divergence.

10. What are the conditions should be satisfied for the existence of plasma?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Explain about continuity equation.

Or

(b) Explain briefly about the transverse nature of electromagnetic waves.

12. (a) Discuss briefly about skin depth.

Or

(b) Explain about the boundary conditions at the surface of discontinuity.

13. (a) Describe the experimental demonstration of anomalous dispersion in gases.

Or

(b) Discuss about Kystron microwave generator.

14. (a) Explain the theory of scattering of e.m. waves in polarization of scattered light.

Or

(b) Describe briefly on electro magnetic fields from retarded potentials of moving point charge.

15. (a) Explain and obtain the derivation of reflection and transmission coefficients at the interface between two dielectric media.

Or

(b) Write a note on pinch effect.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Explain the propagation of plane electromagnetic waves in isotropic medium.

17. Derive Clausius – Mossotti relation.

18. Explain rectangular waveguides in detail.

19. Derive an equation for dispersion in gases.

20. Describe the coherence and incoherence of scattered light.

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D–4548

Sub. Code
34531

DISTANCE EDUCATION

M.Sc. (Physics) DEGREE EXAMINATION, MAY 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. State stark effect.

2. What is dissociation energy?

3. Mention the importance of microwave spectroscope.

4. State Franck-Codon principle.

5. Define Mutual exclusion principle.

6. Write a note on Multiphoton process.

7. What is hyper Raman scattering?

8. State the principle of inverse Renan Scattering.

9. Define chemical shift.

10. What is NQR?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Explain the hydrogen – atom spectrum.

Or

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

12. (a) What is a non-rigid rotator? How does it account for rotational spectroscopy?

Or

(b) Brief the instrumentation of IR spectrometer with neat diagram.

13. (a) What is dissociation energy? Arrive an expression for the maximum number of Vibrational levels below the dissociation limit.

Or

(b) Explain the vibrational course structure of the electronic bond.

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

Or

(b) Give some of the characteristic properties of the stimulated emissions.

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

Or

(b) Determine the crystal symmetry using Mossbauer spectroscopy.

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

Answer any THREE questions.

16. Discuss the Raman spectrum of symmetric top molecules.

17. Describe the molecular orbital theory in detail.

18. Write a detailed account on how intensities of transition between vibrational states are calculated using Franck Condon's Principle.

19. Describe the principle and action of photo acoustic scattering.

20. Elucidate the following :

    (a) Block equations

    (b) Importance of chemical shift in NMR spectroscopy.

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D–4549

Sub. Code
34532

DISTANCE EDUCATION

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

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 $\sigma_x\sigma_y + \sigma_y\sigma_z = 0$ where σ_x, σ_y and σ_z are Pauli's spin matrices.

2. When do you call a potential as self-consistent potential?

3. Differentiate symmetric and antisymmetric wave function.

4. What is called central field approximation?

5. Define exchane degeneracy.

6. List the selection rules of allowed transition.

7. Why the field has to be quantized?

8. Give examples of relativistic field and non relativistic fields.

9. Define Ramsaur Townsend effect.

10. What are s-waves and p-waves?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Obtain the recursion relations to compute CG coefficients.

Or

(b) Show that :

(i) $\lfloor J^2, J_2 \rfloor = 0$ and

(ii) $[J_2, J_x] = \hbar J_{\pm}$.

12. (a) Discuss the elementary ideas of Hartree method in field technique.

Or

(b) Classify the elements in the periodic table based on electronic structure and explain how self consistent field theory aids in this classification.

13. (a) Describe briefly the significance of negative energy states with the help of energy spectrum.

Or

(b) Arrive at the classical field equation in Lagrangian form.

14. (a) Give details about :

(i) Bosons and fermions

(ii) Creation and annihiliation operators.

Or

(b) Write about diffusion scattering.

15. (a) What is scattering amplitude? How it is related to scattering cross-section?

Or

(b) Explain how to quantise a diarc field.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Obtain the matrices for the operators J^2, J_2, J_x and J_y.

17. Explain the self consistency of a field using Hartree-Fock method.

18. Obtain the Dirac's matrices and write down some of its properties.

19. Determine the energy eigen value of relativistic hydrogenation by solving the associated Klein Gorden equation.

20. Discuss the general theory of partial wave analysis in scattering.

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D–4550	Sub. Code
	34533

DISTANCE EDUCATION

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

Third Semester

MICROPROCESSOR AND ELECTRONIC DEVELOPMENT – INSTRUMENTATION

(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 Bus in microprocessor?

2. What is the data and address size in 8086?

3. What is direct addressing? Give an example.

4. List the features of an 8051 microcontroller.

5. What is mashing and why it is required?

6. What is resolution in DAC?

7. Define sample and hold circuit.

8. What is PN junction diode?

9. List the advantages of LUDT.

10. Differentiate Photovoltaic cell and photo-conductive cell.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Draw the pin diagram of 8086.

Or

(b) Discuss about the classification of addressing modes in 8085.

12. (a) Describe memory organization in 8051 based system.

Or

(b) Explain the interrupts of 8051.

13. (a) Pin configuration of peripheral interface 8255.

Or

(b) List the features of DMA controller 8257.

14. (a) Write a note on thermo-resistive transducers.

Or

(b) Explain the type of comparators.

15. (a) Write a note on linear variable differential transformer.

Or

(b) Explain the working principle of piezoelectric transducers.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Discuss about the architecture of 8086 with necessary diagrams.

17. Classify interrupt and explain the interrupt of 8085.

18. Draw the block diagram of stepper motor control and explain it.

19. Discuss about temperature transducers and it's classifications.

20. Write a detailed note on DAC and its types.

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D–4551

Sub. Code
34541

DISTANCE EDUCATION

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

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 primitive and non-primitive unit cell.

2. Derive width band of simple crystal structure.

3. Define Phonons.

4. Define fermi energy.

5. State any four properties of ferromagnetic material.

6. Define ferromagnetism with an example.

7. What is dielectric constant?

8. Define coherence length.

9. What is cryotron?

10. What is isotope effect in superconductivity?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) With neat labelled diagram describe Bravais lattice in two dimensions.

Or

(b) Describe translation symmetry operation in detail.

12. (a) Explain the SC and BCC in detail with some suitable examples.

Or

(b) Write a short note on electrical properties of metals.

13. (a) Discuss the Hall effect in detail.

Or

(b) Explain the quantum theory of paramagnetism.

14. (a) Distinguish paramagnetic and ferromagnetic materials.

Or

(b) Define superconductor and write a short note on type I superconductor with example.

15. (a) Derive A.C. Josephson effect.

Or

(b) Derive London equations and hence explain the observed Meissner effect.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. With neat schematic diagram, discuss powder method of crystal diffraction.

17. Derive Clausius – Mosotti equation in dielectric.

18. Derive the Langevin's theory of paramagnetism.

19. Describe BCS theory of superconductivity.

20. Write a short note on following terms :

    (a) Normal tunneling effect

    (b) High temperature superconductors.

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D–4552

Sub. Code
34542

DISTANCE EDUCATION

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

Fourth 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. Define Alpha decay.

2. State electron capture.

3. List out postulate of liquid drop model.

4. What is double magic number?

5. List out different types of nuclear reactions.

6. Define the role of nuclear force.

7. Enumerate methods of partial wave analysis.

8. Why do we need nuclear reactors?

9. What is Lepton and strangeness?

10. Define translational space.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Explain in short nuclear isomerism.

Or

(b) Briefly explain why Kurie plots applicable only for β - decay.

12. (a) Write a short note on Bohr Wheeler theory.

Or

(b) What are the validity and limitations of single particle model?

13. (a) How will you distinguish nuclear fission and fusion?

Or

(b) Briefly explain the effective range theory of n-p scattering at low energy.

14. (a) Describe in short – neutron cycle in a thermo nuclear reactor.

Or

(b) State and explain the working of spherical nuclear reactor.

15. (a) Derive an expression for Gell-Mann Nishijima formula

Or

(b) Write a short note on relativistic kinematics.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. With the neat illustration, explain in detail Gamow's theory of Alpha decay.

17. Discuss in detail shell model and explain the same using rotational spectra.

18. Explain in detail resonance scattering cross section.

19. Write a short note on

    (a) Sub-nuclear particle.

    (b) CPT-invariance

    (c) Rotational in space.

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

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D–4553	Sub. Code
	34543

DISTANCE EDUCATION

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

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. On what basis are polymers classified?

2. Give some examples of corrosion resistant material.

3. What are vacuum pumps used for?

4. Write the principle of vapour phase epitaxy.

5. Explain briefly about Pockel's effect

6. What are the main components of a He-Ne laser?

7. Describe Pseudo-elasticity.

8. In which applications Nitinol can be used.

9. Define piezo-resistive MEMS.

10. What are the uses of silicon oxide based MEMS.

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Define creep and fatigue in the behaviour of elastic materials.

Or

(b) Give short note on the applications of polymers.

12. (a) Describe about lattice misfit and imperfections.

Or

(b) Write the working principle of Piranai Gauge.

13. (a) Explain population inversion in four level lasers.

Or

(b) Elaborate the working principle of Helium-Neon laser with neat diagram.

14. (a) Give brief note on carbon matrix composites.

Or

(b) What are the electrochemical applications of composite materials?

15. (a) Differentiate between piezoelectric and piezo-resistive materials.

Or

(b) Write short note on micro accelerometers.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Explain in detail about the addition and condensation polymerization.

17. Elaborate the vapour phase and liquid phase epitaxial growth of thin films.

18. Describe about the phenomena of optical Ken effect.

19. Distinguish between metal matrix composite and ceramic matrix composites in detail.

20. Explain the working mechanism of shape memory alloys.

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