

المفردات	الوحدات	المادة	ت
<p>1. Light propagation.</p> <p>(1-1)- Elementary optical phenomena and the nature of light.</p> <p>(1-2)- The electrical constants and speed of light.</p> <p>(1-3)- The plane harmonic waves, phase velocity, sources of electromagnetic waves.</p> <p>(1-4)- Alternative way of representing harmonic waves.</p> <p>(1-5)- group velocity.</p> <p>(1-6)- Doppler effect in light and its applications.</p> <p>2. The vectorial nature of light.</p> <p>(2-1)- Energy flow, the Poynting vector.</p> <p>(2-2)- Polarization and its types.</p> <p>(2-3)- Matrix representation of polarization (the Jones calculus).</p> <p>(2-4)- Jones matrices for linear optical elements such as, polarizers and retardation plates.</p> <p>(2-5)- Reflection and refraction at a plane boundary.</p>	٢	البصريات الفيزيائية (1) (ف) ١	1

<ol style="list-style-type: none"> <li>1. Principles of the laser.</li> <li>2. Pumping schemes.</li> <li>3. Properties of lasers.</li> <li>4. Interaction rays with matter.</li> <li>5. Einstein coefficients and find their relationships.</li> <li>6. Optical stimulation of atoms.</li> <li>7. Population inversion.</li> <li>8. Form and wide of spectral lines.</li> <li>9. Saturation.</li> <li>10. Amplifier real laser.</li> <li>11. Terminology spectroscopic and units.</li> <li>12. Types of lasers.</li> <li>13. The efficiency.</li> <li>14. Spherical optical cavities (resonator).</li> </ol>	٢	فيزياء الليزر	2
<ol style="list-style-type: none"> <li>1. Fundamental concepts vectors.</li> <li>2. Newtonian mechanics rectilinear motion of a particle.</li> <li>3. General motion of a particle in three dimensions.</li> <li>4. Noninertial reference systems</li> </ol>	٣	الميكانيك التحليلي ا	3
<ol style="list-style-type: none"> <li>1- Introduction</li> <li>2- The crystalline state</li> <li>3- Unit cells</li> <li>4- Symmetry and element of symmetry</li> <li>5- Miller indices and crystal direction</li> <li>6- Crystal structure</li> <li>7- Types of bonds</li> <li>8- X- ray Neutron and Electron diffraction</li> <li>9- Reciprocal lattice and Brillion zone</li> <li>10- Crystalline defect</li> </ol>	٢	علم البلورات	4

1. Matrices and systems of linear equations.
  - 1-1 Some special matrices.
  - 1-2 Determinants.
  - 1-3 The inverse and related matrices.
  - 1-4 Matrices algebra.
  - 1-5 Diagonalization of matrices.
  - 1-6 Transformations and mapping
  - 1-7 Systems of linear algebraic equations.
  - 1-8 Eigenvalues and eigenvectors.
2. Gamma and beta functions.
  - 2-1 Gamma function.
  - 2-2 Beta function.
  - 2-3 Relation between beta and gamma functions.
3. Fourier analysis.
  - 3-1 Fourier series.
  - 3-2 Complex fourier series.
  - 3-3 Advantage fourier series.

٣

الرياضيات والنمذجة (ف ١)

- 1-2 Types of discharge.
- 2. Fundamental processes.
  - 2-1 The kinetic theory of a simple gas.
  - 2-2 Collisions.
    - 2-2-1 Elastic-collision.
    - 2-2-2 Inelastic-collision.
    - 2-2-3 Attachment and recombination.
    - 2-2-4 Mobility.
    - 2-2-5 Diffusion.
- 3. Electrode effects.
  - 3-1 Thermoionic emission.
  - 3-2 Photoelectric emission.
  - 3-3 Emission by electron impact.
  - 3-4 Emission by positive-ion impact.
  - 3-5 Emission by neutral atom impact.
  - 3-6 Field emission.
- 4. Breakdown.
  - 4-1 The townsend discharge.
  - 4-2 Effect of space charge.
  - 4-3 Effect of secondary emission.
  - 4-4 The townsend criterion.
  - 4-5 paschen's law.
- 5. Plasma measurements.
  - 5-1 Probe measurement.
  - 5-2 measurements from emission spectra.

Experiments involve on optics and electrical measurements

٢	فيزياء البلازما	6
٣	الفيزياء العملية (أ) (ف ١)	7

<p>1- The brewster angle  2- The evanescent wave in total reflection  3- Fresnel's rhomb  4- Coherence and interference  5- The principle of linear superposition  6- Young's experiment</p>	<p>٢</p>	<p>البصريات الفيزيائية (II) (ف٢)</p>	<p>8</p>
<p>1- Laser in length :measurement of length; interferometry, surface topology&amp; optical component testing.  2- Laser plasma interaction: Basic concepts and tow-fluid description of plasmas, electromagnetic wave propagation in plasmas  3- Holography: the wavefront reconstruction process: inline hologram, the off axis hologram  4- Industrial: cutting, welding, drilling, ranging, barcode scanners, CD players  5- Medical: examples: laser scalpels, photo-dynamic therapy, cataract correction.  6- Scientific: Absorption spectroscopy; Emission Techniques (Laser Induced Fluorescence) Scattering Techniques , Pump and Probe Techniques; diagnostics of excited states Signal to Noise Ratio Considerations  7- Optical communication  Laser in the army : Measure distances, Missile guidance , Destroy targets the plan .</p>	<p>٢</p>	<p>تطبيقات الليزر</p>	<p>9</p>

<p>1- General forces and celestial Mechanics  2- Dynamics of system of many particles  3- Mechanics of rigid bodies motion  4- Motion of a rigid bodies in three dimensions  5- Lagran gian Mechanics  6- Dynamics of oscillating systems</p>	٣	الميكانيك التحليلي (II) (٢ف)	10
<p>1- Introduction  2- Force and Energy between zons, atoms and molecules  3- Crystal growth  4- Phase equilibrium and phase equilibrium diagram  5- Mechanical properties of material  6- Some types of materials  (6-1)- Polymer material  (6-2)- Ceramic material  (6-3)- Composite material  7- Corrosion of metals</p>	٢	علم المواد	11

## 1- Complex Analysis

(1-1)- Complex number (review)

(1-2)- Complex Function

(1-3)- Limits , Continuity and derivatives

(1-4)- Cauchy – Riemann equations

(1-5)- Series Complex numbers

(1-6)- Power series representation (Taylor's and Laurent's expansion)

(1-7)- Singularities

(1-8)- The residue theorem

(1-9)- Some applications of residue theorem

## 2- Ordinary Differential Equations

(2-1)- Laplace transform (Solution of initial value problem , Shifting theorem)

(2-2)- Power series using recurrence relation

(2-3)- Power series solution of initial boundary problem Numerical Analysis

## 3- Numerical methods using Matlab

٣

(1-1)- Short Historical overview			
(1-2)- Molecular Formation			
(1-3)- The Hz molecules			
(1-4)- Molecular orbital's			
2- Electronic structure of molecules			
(2-1)- Introduction			
(2-2)-poleutional Energy par baler for Hydrogen molecules			
(2-3)- Bond in Diatomic molecules			
(2-4)- Born- oppenheimer Approximation			
(2-5)- Electronic Energy Levels			
3- Rotational Energy			
(3-1)- Rotated			
(3-1-1)- Linear molecules			
(3-1-2)- Symmetric Top molecules	٢		
(3-1-3)- Spherical Top molecules			
(3-1-4)- As symmetric Top molecules			
(3-2)- Molecular spectra			
(3-3)-The Rotational Energy of Linear molecular(Rigid Rotater)			
(3-4)- Population of Rotational Energy Levels			
(3-5)- Non Rigid Rotater			
4- Vibrational Energy			
(4-1)- Harmonic-vibration of Diatomic molecules			
(4-2)- Population of vibrational Energy Levels			
(4-3)- Vibrational Energy Levels polyatomic molecules			
5- Vibrating – Rotator Energies			
(5-1)- The Diatomic vibrating – Rotator spectrum		الفيزياء الجزيئية	13
Experiments involve on optics			
Electrical measurements	٣	الفيزياء العملية (II)(ف٢)	14