

تفاصيل المفردات	اسم المادة	ت
<p>1. Variable stresses and Design Criteria.</p> <p>2. Spur Gear Design.</p> <p>3. Power Screws design.</p>	Mechanical Design (مرحلة رابعة)	1
<p>1. Sampled Data Control Systems: Sampling and reconstruction, properties of sampled signal, ideal Sampler, Z.O.H.</p> <p>2. Analysis of Discrete Control System: Open-loop system, closed-loop system, system time-response, steady state error analysis, mapping S-plane /Z-plane.</p> <p>3. Stability Analysis: Bilinear transformation, Z into W, the Routh-Hurwitz criterion, and Jury's stability test.</p> <p>4. Design of Digital Controllers: Direct design controller, dead-beat controller, PID controller, Design and realization, response between sampling instants, discrete Time equivalent controller, Root locus, Modified Z- transform.</p> <p>5. Time -Domain Analysis: Impulse Response and step response for LTI processors (systems). Digital convolution. Difference equations.</p> <p>6. Frequency-Domain Analysis (I): Discrete Fourier Transform (DFT), DFT for periodic sequences, DFT for aperiodic digital sequence, DFT properties. Fast Fourier Transform (FFT). Frequency Response of LTI processor.</p> <p>7. Frequency –Domain Analysis the Z-transform. Definition and properties of the Z-transform. Z-plane poles and Zeros.</p> <p>8. Design of Recursive digital filter (IIR): Simple design based on Z-plane poles and zeros. Filters derived from analog designs. Frequency sampling filters.</p>	Computer Control (مرحلة رابعة)	2
<p>1. Neural networks (NNs): - Artificial Neuron Types of Activation functions types of</p>	Intelligent Control Systems	٣

<p>NNs (Feed-forward, Feedback, Supervised and Unsupervised), and types of recall.</p> <ul style="list-style-type: none"> - Learning Algorithms: Hebbian, perceptron and delta learning rules. - Generalized delta learning rule (Error back propagation algorithm for single and multiple layers). <p>2. Fuzzy Logic (FL):</p> <ul style="list-style-type: none"> - Fuzzy concepts, Fuzzy sets, and Fuzzy operations. - Fuzzification, Inference Engine, Rule-Base, and defuzzification - Fuzzy Logic Control (FCL). <p>3. Binary Genetic Algorithm (GA):</p> <ul style="list-style-type: none"> - Elements of GA, Genetic Operators, Initialization, Coding, Fitness Function, Selection, Crossover (Mating), and Mutation. 	<p>(مرحلة رابعة)</p>	
<p>1. Introduction to Industrial Robot Manipulator:</p> <ul style="list-style-type: none"> - Robotics. - Classification of robots. - Advantages and disadvantages of robots. - Robot components. - Anatomy of a robot. - Robot degrees of freedom. - Robot Coordinates. - Robot Reference Frames. - Robot languages. - World Reference Frame. - Joint Reference Frame. - Tool Reference Frame. <p>2. Robot Kinematics:</p> <ul style="list-style-type: none"> - Matrix Representation of A point in space. - Representation a Vector in space. - Representation of the reference frame at the origin. - Representation of A Frame in space relative to the reference frame. - Representation of a Rigid Body. - Homogeneous Transformation matrices. 	<p>Robotics (مرحلة رابعة)</p>	<p>٤</p>

<ul style="list-style-type: none"> - Representation of Transformation: pure Translation, Pure. - Rotation combined Transformations. - Robot Arm Kinematics. - Manipulator parameters. - The Denavit-Hartenberg (D-H) Representation, Arm Matrix. <p>3. Robot Inverse Kinematics:</p> <ul style="list-style-type: none"> - Inverse Kinematics (Geometric Approach). - Two-Link Planar Robot. - Articulated Configuration. <p>4. Robot Trajectory planning:</p> <ul style="list-style-type: none"> - Path Vs Trajectory planning. - Joint-Space Vs. Cartesian-space Descriptions. - Basics of Trajectory planning. - Joint-space Trajectory planning methods. - Third-order polynomial Trajectory planning. 		
<p>1. Linear algebra and Matrices:</p> <ul style="list-style-type: none"> - Vector, Solution of linear equations, Matrices. <p>2. Ordinary differential equations:</p> <ul style="list-style-type: none"> - Series solution to ODE (power series solution, Legendre polynomial, Frobenius solution and Bessel's function) and Partial differential Equations. <p>3. Complex Analysis.</p> <p>4. Numerical Analysis.</p>	<p>Mathematics (II) (مرحلة ثالثة)</p>	<p>٥</p>
<p>1. Signal flow graph and Mason's formula.</p> <p>2. Transient Response Analysis.</p> <p>3. Routh – stability criterion.</p> <p>4. Root locus design of lead, lag, and lag-lead compensator.</p> <p>5. PID controller design.</p> <p>6. Bode plot.</p> <p>7. Nyquist stability.</p> <p>8. Describing function techniques.</p> <p>9. Phase plane method.</p>	<p>Control (مرحلة ثالثة)</p>	<p>٦</p>
<p>1. Introduction to OP-Amp</p> <p>Analysis of Typical 741 OP-Amp with Negative Feedback, Partial OP-Amp, Circuit, Offset Voltages, Compensation, Drift, I/P Bias Current, CMRR, Data Sheets and</p>	<p>Electronics (II) and Microprocessors (مرحلة ثالثة)</p>	<p>٧</p>

<p>Characteristics, Frequency Response, Slew Rate.</p> <p>2. Linear Application: DC and AC Amplifiers, Inverting & Non-inverting Amplifiers, Summer, Integrator, Differentiator, Instrumentation Amplifier Voltage to Current & Current to Voltage Converters, Dual Phase Amplifiers, Electronic Analog Computation.</p> <p>3. Internal Architecture of the 8086 Mp.</p> <p>4. External Architecture of the 8086 Mp.</p> <p>5. Addressing Modes.</p> <p>6. Instruction Set.</p> <p>7. Stack.</p> <p>8. Interfacing with 8255</p>		
<p>1. Particle Kinematics: Continuous Motion, Curvilinear Motion: Rectangular, Force & Acceleration” Equations of Motion in Rectangular”, Work & Energy.</p> <p>2. Rigid Body Kinematics: Relative Motion Acceleration Analysis, Force & Acceleration, Kinetic Energy, Work by a Force, Work by a Couple Principle of Work & Energy.</p> <p>3. Vibration: Free Vibration of Single DOF Systems, Harmonically Excited Vibration, Vibration under General Forcing Conditions, Two DOF Systems, Determination of Natural Frequencies and Mode Shapes, Vibration Control, Vibration Measurement and Applications.</p>	<p>Dynamic (مرحلة ثالثة)</p>	<p>٨</p>
<p>1. Bipolar Junction Transistor (BJT): Construction, Operation, Characteristics, Configuration (C.E, C.B, C.C), Ratings.</p> <p>2. D.C. Biasing and Thermal Stability: Biasing Techniques, Stability Factors, Effect of Temperature.</p> <p>3. Small Signal Analysis of BJT and FET Amplifiers: H-parameters Mode, re-model, Equivalent Circuit, Voltage Gain, Current Gain, Input Impedance, Output Impedance.</p>	<p>Electronics (I) (مرحلة ثانية)</p>	<p>٩</p>

<p>4. Field Effect Transistor (FET): Construction, Types, Characteristics, Biasing and D.C. Analysis.</p> <p>5. FET Amplifiers: A.C. Analysis of Common Source, Common Drain, Common Gate Amplifiers.</p>		
<p>1. Calculus: limit and continuity, Differentiation, Integration, Series and sequence</p> <p>2. Partial derivative.</p> <p>3. Vector valued function.</p> <p>4. Double integral.</p> <p>5. Fourier series and Laplace transform.</p> <p>6- Ordinary differential equations, first order, linear set of equations</p>	<p>Mathematics (I) (مرحلة أولى + مرحلة ثانية)</p>	<p>10</p>