



المرحلة الرابعة

الوحدة	الساعات الأسبوعية			الساعات الأسبوعية	عنوان المادة	رقم المادة
	م	ع	ن			
5	1	1	2	4	تصميم منظومات المكائن	ME 4301
5	1	1	2	4	سيطرة و قياسات	ME 4302
5	1	1	2	4	تبريد و تكييف	ME 4303
5	1	1	2	4	أهتزازات	ME 4304
5	1	1	2	4	محطات قدرة	ME 4305
4	-	-	2	2	هندسة الصناعية	ME 4306
4	-	-	2	2	مواد هندسية	ME 4307
4	-	2	1	3	مشروع هندسي	ME 4308
37					المجموع	

المرحلة : الرابعة	
اسم المادة : تصميم أجزاء المكائن II	
الرمز : ME4301	
الهدف : تعريف الطالب على مكونات وعمل المنظومات الميكانيكية والتصميم الصحيح لأجزائها المنظومات	
الاسبوع	الموضوع
التسلسل	الموضوع
١,٢	Power Screws: types of Power Screws Torque Required to Raise Load by Square Threaded Screws, Torque Required to Lower Load by Square Threaded Screws, Efficiency of Square Threaded Screws, Maximum Efficiency of Square Threaded Screws, Efficiency vs. Helix Angle, Overhauling and Self locking Screws, Efficiency of Self Locking Screws, Coefficient of Friction, Acme or Trapezoidal Threads, Stresses in Power Screws.



	٣,٤	Flat Belt Drives: Types of Belt Drives, Working Stresses in Belts, Density of Belt Materials, Belt Speed, Coefficient of Friction Between Belt and Pulley, Standard Belt Thicknesses and Widths, Velocity Ratio of a Belt Drive, Slip of the Belt, Creep of Belt, Length of Belt Drive, Power transmitted by a Belt, Ratio of Driving Tensions for Flat Belt Drive, Centrifugal Tension, Maximum Tension in the Belt, Condition for Transmission of Maximum Power, Initial Tension in the Belt.
	٥,٦	V-belts and Pulleys, Types of V-belts and Pulleys. Standard Pitch Lengths of V-belts, Advantages and Disadvantages of V-belt Drive over Flat Belt Drive.
	٧,٨	Rope Drives, Fiber Ropes, Advantages of Fiber Rope Drives, Sheave for Fiber Ropes, Ratio of Driving Tensions for Fiber Rope, Wire Ropes, Advantages of Wire Ropes, Construction of Wire Ropes, Classification of Wire Ropes, Designation of Wire Ropes. Properties of Wire Ropes, Diameter of Wire and Area of Wire Rope, Factor of Safety for Wire Ropes, Wire Rope Sheaves and Drums, Wire Rope Fasteners, Stresses in Wire Ropes, Procedure for Designing wire Rope.
	٩,١٠	Chain Drive: Relation Between Pitch and Pitch Circle Diameter, Velocity Ratio of Chain Drives, Length of Chain and Centre Distance, Classification of Chains, Hoisting and Hauling Chains, Conveyor Chains, Power Transmitting Chains, Factor of Safety for Chain Drives, Design Procedure for Chain Drive.
	١١,١٢	Brakes: Energy Absorbed by a Brake, Heat to be Dissipated during Braking, Materials for Brake Lining, Types of Brakes, Single Block or Shoe Brake, Pivoted Block or Shoe Brake, Double Block or Shoe Brake, Simple Band Brake, Differential Band Brake, Band and Block Brake, Internal Expanding Brake.
	١٣,١٤	Clutches: Types of Clutches, Positive Clutches, Friction Clutches, Material for Friction Surfaces, and Considerations in Designing a Friction Clutch, Types of Friction Clutches, Single Disc or Plate Clutch, Design of a Disc or Plate Clutch, Multiple Disc Clutch, Cone Clutch.
	١٥	Holiday
	١٦	Review and discussion
	١٧,١٨	Half-year Break
	١٩,٢٠	Super Gears: Friction Wheels, Advantages and Disadvantages of Gear Drives, Classification of Gears, Terms used in Gears, Condition for Constant Velocity Ratio of Gears–Law of Gearing, Forms of Teeth, Cycloid Teeth, Involute Teeth, Comparison Between Involute and Cycloid Gears, Systems of Gear Teeth, Standard Proportions of Gear Systems, Interference in Involute Gears, Minimum Number of Teeth on the Pinion in order to Avoid Interference, Gear Materials, Design Considerations for a Gear Drive, Beam Strength of Gear Teeth-Lewis Equation, Permissible Working Stress for Gear Teeth in Lewis Equation, Dynamic Tooth Load, Static Tooth Load, Wear Tooth Load, Causes of Gear Tooth Failure, Design Procedure for Spur Gears, Spur Gear Construction, Design of Shaft for Spur Gears, Design of Arms for Spur Gears.
	٢١,٢٢	Bevel Gears: Classification of Bevel Gears, Terms used in Bevel Gears, Determination of Pitch Angle for Bevel Gears, Proportions for Bevel Gears, Formative or Equivalent Number of Teeth for Bevel Gears-Tredgold's Approximation, Strength of Bevel Gears, Forces Acting on a Bevel Gear, Design of a Shaft for Bevel Gears.
	٢٣,٢٤,٢٥	Worm Gears: Types of Worm Gears, Terms used in Worm Gearing, Proportions for Worms, Proportions for Worm Gears, Efficiency of Worm Gearing, Strength of Worm Gear Teeth, Wear Tooth Load for Worm Gear, Thermal Rating of Worm Gearing, Forces Acting on Worm Gears, Design of Worm Gearing.
	٢٦,٢٧,٢٨	Rolling Contact Bearings: Advantages and Disadvantages of Rolling Contact Bearings Over Sliding Contact Bearings, Types of Rolling



		Contact Bearings, Types of Radial Ball Bearings, Standard Dimensions and Designation of Ball Bearings, Thrust Ball Bearings, Types of Roller Bearings, Basic Static Load Rating of Rolling Contact Bearings, Static Equivalent Load for Rolling Contact Bearings, Life of a Bearing, Basic Dynamic Load Rating of Rolling Contact Bearings, Dynamic Equivalent Load for Rolling Contact Bearings, Dynamic Load Rating for Rolling Contact Bearings under Variable Loads, Reliability of a Bearing, Selection of Radial Ball Bearings, Materials and Manufacture of Ball and Roller Bearings, Lubrication of Ball and Roller Bearings.
	٢٩	Sliding Contact Bearings: Classification of Bearings, Types of Sliding Contact Bearings, Hydrodynamic Lubricated Bearings, Assumptions in Hydrodynamic Lubricated Bearings, Important Factors for the Formation of Thick Oil Film, Wedge Film Journal Bearings, Squeeze Film Journal Bearings, Lubricants, Properties of Lubricants, Terms used in Hydrodynamic Journal Bearings, Bearing Characteristic Number and Bearing Modulus for Journal Bearings, Coefficient of Friction, Critical Pressure, Sommerfeld Number, Heat Generated. Design Procedure, Solid Journal Bearing, Bushed Bearing, Split Bearing or Plummer Block, Design of Bearing Caps and Bolts, Oil Grooves, Thrust Bearings, Foot-step or Pivot Bearings, Collar Bearings.
	٣٠, ٣١, ٣٢	Computer Aided Design
2ND Term Exam		

		المرحلة :	الثالثة
		اسم المادة :	سيطرة
		الرمز :	ME4302
		الهدف :	تهدف المادة الى تعريف الطالب بالمفاهيم الأساسية لتحليل وتصميم منظومات السيطرة
الاسبوع	التسلسل	الموضوع	
	1	Introduction and definitions <ul style="list-style-type: none"> Basic definitions about the concepts of control 	
	2	Mechanical system and Transfer Function <ul style="list-style-type: none"> Definition of transfer function Deriving the transfer function for three basic parts of mechanical system 	
	3	Torsional system <ul style="list-style-type: none"> Deriving the transfer function for three basic parts of torsional system 	
	4	Electrical system, series and parallel connections <ul style="list-style-type: none"> Deriving the transfer function for three basic parts of electrical system connected in parallel and series 	
	5	Thermal and fluid systems <ul style="list-style-type: none"> Deriving the transfer function for thermal and fluid systems Examples 	
	6	Hydraulic system <ul style="list-style-type: none"> The basic concept of working the hydraulic system 	



		<ul style="list-style-type: none"> Deriving the transfer function of the system
7		Hydraulic servomotor system <ul style="list-style-type: none"> Leverage system and deriving the transfer function for three cases of fixing Method of connection with hydraulic system
8		Pneumatic system <ul style="list-style-type: none"> The basic concept of working the pneumatic system Deriving the transfer function of the system
9		Block diagram <ul style="list-style-type: none"> The principles of block diagram The basic nine rules for reduction the block diagram
10		Block diagram reduction <ul style="list-style-type: none"> Method of reduction of block diagrams of multi-input and output
11		Types of control and Laplace Transformations <ul style="list-style-type: none"> Types of control methods and basic functions of Laplace transformations
12		Test signals <ul style="list-style-type: none"> The different types of test signals
13		Response of first order system <ul style="list-style-type: none"> Method of computing the response of first order system Examples
14		Response of second order system <ul style="list-style-type: none"> Method of computing the response of second order system Examples
15		Response specifications <ul style="list-style-type: none"> The specification of response which determine the stability of system
16		Steady state error <ul style="list-style-type: none"> Computing the steady state error by using Tayler method and normal method and compare between them
17		Response improvement <ul style="list-style-type: none"> The methods of response improvement Examples
18		System stability <ul style="list-style-type: none"> The concept of system stability and its effect on control process
19		Routh criterion
20		<ul style="list-style-type: none"> The Routh criterion for computing the stability of system
21		<ul style="list-style-type: none"> Examples
22		Root-locus method
23		<ul style="list-style-type: none"> The root-locus method for computing system stability
24		<ul style="list-style-type: none"> Basic rules of root-locus method Examples
25		Polar-plot diagrams
26		<ul style="list-style-type: none"> The polar plot for computing system stability The method of polar plot diagram for computing the gain
27		<ul style="list-style-type: none"> Examples



28		Logarithmic Scales and Bode Plots <ul style="list-style-type: none"> • Basic principles of logarithmic scale and Bode plots • The method of construction of Bode plots • Examples
29		
30		

المرحلة :		الرابعة
اسم المادة :		تبريد وتكييف الهواء
الرمز :		ME4303
الهدف :		حسابات احمال التدفنه والتبريد،تصميم منظومة توزيع الهواء،عمليات تكييف الهواء،دورة التثليج الأنظغاطيه ، المعدات الأساسية:الضاغط،المكثف،المبخر،صمام التمدد.
الاسبوع	التسلسل	الموضوع
	1	مقدمة
	2	الخواص الثرموديناميكية للهواء الرطب
	3	=
	4	مخطط خواص الهواء الرطب
	5	اجراءات تكييف الهواء الاساسيه
	6	اجراءات تكييف الهواء العمليه
	7	دورات تكييف الهواء
	8	عمليات التكييف
	9	الراحة الحرارية
	10	الظروف التصميميه
	11	حسابات حمل التدفنه
	12	=
	13	=
	14	حسابات حمل التبريد
	15	=
	16	=
	17	تصميم منظومة مجاري الهواء
	18	=
	19	تصميم منظومة الأنايبب
	20	موانع التجميد
	21	دورة التجميد الأنظغاطيه الاساسيه
	22	=
	23	دورة التجميد الحقيقيه
	24	=



25		معدات دورة التجميد
26		=
27		دورة التجميد الامتصاصية الأساسية
28		دورة بروميد الليثيوم - ماء الامتصاصية
29		=
30		دورة- الماء - الأمونيا

المرحلة :		الرابعة
اسم المادة :		اهتزازات
الرمز :		ME4304
الهدف :		Thompson, W. T., Theory of Vibration with Applications Inc., 5th Edition, 1998.
الاسبوع	التسلسل	الموضوع
	1	Basic concepts of vibration
	2	Introduction to oscillatory motion
	3	Free vibration of an undamped single degree of freedom system
	4	Energy method (Rayleigh Principle)
	5	Free vibration of a viscously damped single degree of freedom system
	6	Equivalent springs and dampers
	7	Decay rate (logarithmic decrement)
	8	Forced vibration of a single degree of freedom syste
	9	
	10	
	11	Rotating unbalance
	12	Whirling of a rotating shaft
	13	Base excitation (support motion)
	14	Vibration isolation
	15	Vibration of measuring instruments
	16	Two - degree of freedom system
	17	
	18	Lagrange's equations



19		Coordinates coupling
20		Undamped vibration absorber
21		Damped vibration absorber
22		Transient vibrations of a single degree of freedom system
23		• Response to step excitation
24		• Response to impulse excitation
		• Response under arbitrary forcing function
25		Vibration of continuous systems
26		• Vibration of string
27		• Longitudinal vibration of bar or rod
		• Torsional vibration of shaft
		• Lateral vibration of beam
28		Rayleigh and Dunkerly methods for determining natural frequencies
29		
30		

		المرحلة :	الرابعة
		اسم المادة :	محطات قدرة
		الرمز :	ME4305
		الهدف :	تعريف الطالب على محطات توليد القدرة وعملها واجزاءها وانواعها و حساب كفاءة المحطات لغرض انتاج طاقة صديقة للبيئة وديمومة تلك الطاقة ومعرفة الاجزاء الميكانيكية للمحطة .
التسلسل	الاسبوع	الموضوع	
1		introduction : power plant , sources of energy, thermal power plants	
2		load curve, ideal and realized load curves, load variation, demand factor	
3		steam generator(boiler), classification, steam formation and thermal efficiency improvement methods	
4		steam generator, boiler heating surface, types of boilers, various advantages of water tube boilers are as follows, fire tube boilers are classified as follows	
5		, various advantages of fire tube boilers are as follows, boiler accessories,	



		boiler auxiliaries, boiler calculation, boiler heat balance, feed water, water impurities, requirements of a good boiler
6		Solve problem
7		steam turbine, principles of operation, types of steam turbine, impulse type, types of impulse turbine, velocity diagram
8		Solve problem
9		steam nozzles, variation of specific volume, area and velocity, effect of friction, nozzle efficiency.
10		the reaction turbine, velocity diagram for reaction turbine stage,
11		Solve problem
12		- steam condensers, surface condensers advantages and disadvantages of a surface condenser, requirements of a modern condenser, jet condensers, types of jet condensers
13		cooling towers, classification of cooling towers, classification on the basis of air flow generation methods
14		steam power plant, vapour cycle, reversible and irreversible processes, the rankine cycle, energy analysis of the ideal rankine cycle,
15		superheating the steam to high temperatures, reheat cycle, rankine cycle with regeneration, types of f.w.h, open or direct contact f.w.h.
16		closed with drains cascaded backward, closed with drain pumps forward.
17		Solve problem
18		gas turbine power plant, theory of operation brayton cycle, advantages of gas turbine power station, disadvantages
19		-compressors, centrifugal compressor construction, diffusers, characteristics of centrifugal compressor, advantage over axial type, axial compressor
20		gas turbine combustors combustion chamber design, flame stabilization, combustion and dilution
21		film cooling of the liner, fuel atomization and ignition, typical combustor arrangements.
22		brayton cycle(joule's cycle), thermodynamic analysis, thermal efficiency



23	deviation of actual gas-turbine cycles from idealized ones, regenerativebrayton cycle
24	different arrangement of gas turbine, closed cycle gas turbine, combined cycle power plants.
25	Solve problem
26	nuclear power plants, working, types, reactor types,pressurized water reactor (pwr), boiling water reactor
27	gas cooled reactors (gcr), advantages of nuclear power plants, disadvantages of nuclear power plant.
28	solar power plants, photovoltaic plants, solar thermal power stations, advantages, disadvantages.
29	wind power ,plant,advantages,disadvantages, inside the wind turbine, horizontal axis wind turbines (hawt's), vertical axis wind turbines (vawt's)
30	geothermal power plant, working, types of geo thermal power plants



المرحلة :		الرابعة
اسم المادة :		الهندسة الصناعية
الرمز :		ME4306
الهدف :		تعليم الطلبة المبادئ الاساسية للهندسة الصناعية ومجالات تطبيقها ودراسة مبادئ بحوث العمليات
الاسبوع	التسلسل	الموضوع
	1	مقدمة عن الهندسة الصناعية
	2	التخطيط للانتاجية
	3	طرق تحسين الانتاجية
	4	انواع انظمة الانتاج
	5	دراسة العمل في المصنع
	6	اهداف دراسة العمل
	7	دراسة الحركة
	8	دراسة الوقت واهميته
	9	التخطيط للمنشئه الصناعية
	10	محاسن التخطيط الجيد
	11	دراسة انواع التخطيط
	12	المفاضلة بين المواقع الصناعية
	13	مناولة المواد في المصنع
	14	العوامل التي تؤثر على نظام المناولة
	15	انواع مناولة المواد
	16	السيطرة والتخطيط للمنتجات
	17	عطلة نصف السنة
	18	دراسة التنبؤ
	19	تصميم المنتج
	20	دراسة تتابع العمليات
	21	انواع الكلفة
	22	تحليل نقطة التعادل
	23	تخفيض نقطة التعادل
	24	الصيانة وانواعها
	25	الامان الصناعي
	26	ادارة المواد في المصنع
	27	السيطرة على الخزين
	28	حسابات الخزين
	29	السيطرة النوعية والفحوصات
	30	المخطط الشبكي والمسار الحرج
	31	نظرية الاحتمالات



المرحلة :		الرابعة
اسم المادة :		مواد هندسية
الرمز :		ME4307
الهدف :		معرفة التطور الحاصل في علم المواد حيث أن اي نوع معلوم من المواد يجب أن يؤخذ بنظر الاعتبار بالنسبة للمهندس، وكذلك يمكن للمهندس أن يتعلم الأمور الأساسية التي تتحكم بخواص هذه المواد.
التسلسل	الاسبوع	الموضوع
1		Atomic Structure
2		Atomic Bonding
3		Arrangement of Atoms in Solid and Crystal Structures
4		Crystallographic Points, Plans and Directions
5		Equilibrium Diagrams. Part 1
6		Equilibrium Diagrams. Part 2
7		Equilibrium Diagrams. Part 3
8		Metals: Ferrous Metals: Carbon Steel
9		Metals: Ferrous Metals: Alloy steel.
10		Metals: Ferrous Metals: Cast Iron
11		Metals: Non-Ferrous Metals: Copper
12		Metals: Non-Ferrous Metals: Aluminum
13		Metals: Non-Ferrous Metals: Magnesium and Titanium
14		Ceramics: Structure and Properties
15		Ceramics: Applications and Processing
16		Polymers: Structure and Properties
17		Polymers: Applications and Processing
18		Composites: Definition and Characterization.
19		Composites: Theory of Composites.
20		Physical Properties of Materials: Electrical Properties.
21		Semiconductor Materials
22		Insulators
23		Physical Properties: Thermal Properties of Materials Part 1
24		Physical Properties: Thermal Properties of Materials Part 2
25		Chemical Properties of Materials

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Mechanical Engineering Dept



26		Corrosion. Part 1
27		Corrosion. Part 2
28		Nano Materials: Principle Concepts
29		Nano Materials: Effect of Nano-scale.
30		Nano Materials: Processing.