مواد الامتحان التنافسي لطلبة الدراسات العليا (الماجستير) قسم هندسة تقنيات ميكانيك القوى

ت	اسم المادة	Subject	الملاحظات
1	الرياضيات	Mathematics	(بكالوريوس)
2	تحليلات عددية وهندسية	Engineering and Numerical Analysis	(بكالوريوس)
3	انتقال حرارة	Heat Transfer	(بكالوريوس)
4	ديناميك الحرارة	Thermodynamics	(بكالوريوس)
5	محركات احتراق داخلي	Internal Combustion Engine	(بكالوريوس)
6	ميكانيك الموائع	Fluid Mechanics	(بكالوريوس)
7	تكنولوجيا المركبات	Vehicles Technology	(بكالوريوس)

المواد الداخلة ضمن الامتحان التنافسي لدراسة الماجستير لقسم هندسة تقنيات القوى

Mathematics

1	Double integration
2	Vectors
3	Materials
4	Partial derivatives
5	Infinite series
6	Differential equations
7	Derivative of functions
8	Method of integration
9	Inverse functions
10	Hyperbolic functions

Engineering Analysis

1	Fourier's method
2	Laplace Transformations (L.T)
3	Inverse Laplace transformations
4	Solution of Ordinary Differential Equation
5	Bessel Functions
6	Numerical interpolation
7	Legendre's equation
8	Game function ϒ(n)
9	Beta function β(m,n)
10	Roots of equations
11	Curve fitting
12	Numerical integration

Thermodynamics

1	Introduction and basic concepts in thermodynamics
2	Properties of a system
3	Temperature and the zeroth law of thermodynamics
4	Pressure and pressure measurement devices
5	Energy , energy transfer and general energy analysis
6	Properties of pure substances
7	Energy analysis of closed systems
8	Mass and energy analysis of control volumes
9	The second law of thermodynamics
10	Entropy
11	Exergy
12	Gas power cycles
13	Vapor and combined power cycles
14	Refrigeration cycles
15	Thermodynamics property relations
16	Gas mixtures

Vehicles technology

1	Clutch automotive
2	Manual transmission
3	Automatic transmission
4	Joints drive axle and C.V
5	Differentials
6	Suspension system

Fluid Mechanics

1	**Fluid properties**
1.1	Specific weight
1.2	Specific gravity
1.3	Ideal gas low
1.4	Newton fluid shear stress
1.5	Viscosity
1.6	Bulk modulus
1.7	Speed of sound in an ideal gas
1.8	Capillarity rise in a tube
2	**Fluid statics**
2.1	Hydrostatic pressure
2.2	Manometer / pressure measurement
2.3	Hydrostatic forces on submerged surfaces
3	**Fluid dynamics**
3.1	The continuity equation
3.2	The Bernoulli equation
3.3	Application of the Bernoulli equation
3.4	The momentum equation
3.5	Application of the momentum equation
4	**Introduction to dimensional analysis**
4.1	dimensional analysis
4.2	Buckingham Pi Theorem
4.3	Dimensionless groups
4.4	Experimental data
4.5	Experimental models
5	**Internal flow**
5.1	Laminar pipe flow
5.2	Turbulent pipe flow
5.3	Dimensional analysis of pipe flow
5.4	Pressure gradients effects
5	**External flows**
5.1	Overview of external flows
5.2	Boundary layer characteristics
5.3	Lift and drag

Internal Composition Engine (IC)

1	Fuel
2	Operating characteristics and performance tests
3	Engine work
4	Performance tests engine cycles valves and valves timing
5	Air and fuel induction
6	Fuel injectors
7	Air and fuel induction
8	Fuel injectors
9	Air and fuel flow in carburetor
10	Superchargers and turbochargers
11	Intake for ci engines
12	Applying the first law of thermodynamics to combustion processes
13	Energy analysis of reacting mixtures
14	Combustion
15	Combustion in I.C. Engines
16	Combustion in CI Engines
17	The exhaust process

Heat Transfer

1. physical origins and rate equations
1.1 conduction
1.2 convention
1.3 radiation
1.4 the thermal resistance concepts
2. introduction to conduction
2.1 the conduction rate equation
2.2 the thermal properties of matter
2.2.1 thermal conductivity
2.2.2 other relevant properties
2.3 the heat diffusion equation
2.4 boundary and initial conditions
3. one dimensional , steady – state conduction
3.1 the plane wall
3.2 an alternative conduction analysis
3.3 radial systems
3.4 conduction with thermal energy generation
3.5 heat transfer from extended surfaces
4. two dimensional , steady – state conduction
4.1 the conduction shape factor and the dimensionless conduction heat rate
5. transient conduction
5.1 the lumped capacitance method
5.2 the semi – infinite solid
6. Heat Exchangers
6.1 Heat exchanger types
6.2the overall heat transfer coefficient
6.3 heat exchanger analysis : use of the log Mean Temperature Difference
6.3.1 the parallel – flow Heat Exchanger
6.3.2 the counter flow heat Exchanger
6.4 Heat Exchanger Analysis: the effectiveness – NTU method
6.4.1 Definitions
6.4.2 Effectiveness – NTU Relations
6.5 Heat Exchanger Design and performance calculations
6.6 compact Heat
1. Convection
7.1 The Convection Boundary Layers
7.2 Local and Average Convection Coefficient
7.3 laminar and turbulent flow

7.4 the boundary layer equations
8.External flow
9. Internal flow
10. Free convection
11 . radiation : processes and properties