مواد الامتحان التنافسي للمتقدمين لدراسة الماجستير للعام الدراسي (2025 – 2026)

اسم المادة باللغة العربية	اسم المادة باللغة الانكليزية
أنظمة معالجة مياه الفضلات	Wastewater Treatment Systems
إدارة النفايات الصلبة	Solid Waste Management
هندسة إسالة المياه	Water Supply Engineering
معالجة الخبث	Sludge Treatment
تلوث الهواء	Air Pollution
تلوث التربة	Soil Pollution
الإحصاء الهندسي	Engineering Statistics
ميكانيك الموائع	Fluid Mechanics

1. أنظمة معالجة مياه الفضلات (Wastewater Treatment Systems)

Competitive Exam - Post-Graduate (MSc Program) – 2025-2026		
Wastewater Treatment Systems, Concept and Design – By G. L. Karia, R. A. Christian and Namrata D. G. Jariwala,2014		
Chapter	**Subject**	**Remarks**
One	**Wastewater and treatment concept** 1- Types of WW. 2- Treatment methods, Treatment systems. 3- Basic design considerations: Flow rates, Design criteria.	
Two	**General procedure for design calculation** 1- General procedure for design calculation, Hydraulic Flow Diagram.	
Three	**Reaction and Reactors** 1- Concept of reaction. 2-Concept of reactors.	
Four	**Design of preliminary treatment units** 1-sum &pump well. 2-Approach channel, Equalization basins, Screens. 3- Grit chambers and aerated grit chambers.	
Five	**Design of primary treatment units** 1-Primary settling tank. 2-Flotation.	
Six	**Biological treatment of wastewater** 1-aerobic process, Removal mechanism 2-Classification of treatment process bio-kinetic, Design consideration.	
Seven	**Design of Secondary treatment unit: suspended growth treatment units** 1-Activated sludge process. 2-Secondary settling tank.	

2. إدارة النفايات الصلبة (Solid Waste Management)

Competitive Exam - Post-Graduate (MSc Program) – 2025-2026		
Textbook: Integrated Solid Waste Management's I & II. By Tchobanoglous Mc-Grow Hill 1993.		
Chapter	**Subject**	**Remarks**
One	Title - Waste generation, - Functional Elements, - Source and Types of Solid Wastes,	
Two	Title - Chemical composition, - Sources and Types of Solid Wastes, - Composition of Municipal Solid Wastes and Compositing,	
Three	Title - Determination of Components in the field, - Public Health and Aesthetics, Onsite Handling, - Generation Rates,	
Four	Title - Collection services, - Collection System, Equipment and Labor Requirements, - Transfer operation, - Onsite Processing of Solid Wastes,	

3. هندسة إسالة المياه (Water Supply Engineering)

Competitive Exam- Post-Graduate (MSc Program) – 2025-2026		
Water Supply and Sewerage - By E. W. Steel and Terence J. McGhee		
Chapter	**Subject**	**Remarks**
Two	- **Quantity of Water** - Forecasting Population - Consumption for Various Purposes - Factors Affecting Consumption - Fire Demand - Density of Population - Periods of Design and Water Consumption Data Required	
Six	- **Collection and Distribution of Water** - Intakes - Lake Intakes - River Intakes - Intakes from impounding reservoirs -	
Eight	- **Quality of Water Supplies** - Impurities of Water - Physical Characteristics of Water - Chemical Characteristics of Water - Bacteriological Characteristics	

Nine	- Tratment of Water- Clarification -Screens -Principles of sedimentation - Discrete Particles - Sedimentation Tank Details -Purposes and Actions o Coagulants - Mixing - Flocculation - Design Criteria	
Ten	- Tratment of Water- Filtration - Filter Types - The Rapid Filter - Theory of Filtration Through Coarse Media - Filter Media - Mixed Media - Gravel - Filtration Rates - The Underdrain System - The Filter Unit and Washwater Troughs - The Washing Process	
Eleven	Miscellaneous Water Treatment Methods - Quality Considerations - Chlorine in Water - Chlorination - Chloramines - Other Disinfection Techniques.	

4. معالجة الخبث (Sludge Treatment)

Competitive Exam - Post-Graduate (MSc Program) – 2025-2026		
Sludge Treatment and Disposal- By Marcos Von Sperling, 2007		
Chapter	**Subject**	**Remarks**
One	**Introduction** - Sludge Characteristics and Production - Importance of sludge characterization - Sources of sludge in wastewater treatment - Types of Sludge	
Two	**Main Contaminants in Sludge** - Heavy Metals - Trace Organic Pollutants - Pathogens - Pathogen Removal from Sludge	
Three	**Sludge Stabilisation** - Sludge Thickening and Dewatering - Sludge Drying Beds (SDBs)	
Four	**Assessment of Sludge Treatment and Disposal Alternatives** - Aerobic Digestion - Anaerobic digestion - Land Application of Sewage Sludge	

5. تلوث الهواء (Air Pollution)

Competitive Exam - Post-Graduate (MSc Program) – 2025-2026		
Air Pollution- By M.N. Rao and H.V.N. Rao, 1989 Air Pollution Control Engineering by Lawrence K. Wang, Norman C. Pereira, Yung-Tse Hung, 2004		
Chapter	**Subject**	**Remarks**
One	**Introduction** - Composition of Earth's Atmosphere. - Global warming and Greenhouse Effects. - The Ozone Layer and Ozone Layer Depletion. - Acid Rain.	
Two	**Sources and Classification of Air Pollutants** - Classification of Pollutants. - Primary and Secondary Air Pollutants. - Stationary and Mobile Sources.	
Three	**Meteorology and Air Pollution** - Meteorological Factors Influencing Air Pollution. - Atmospheric Stability. - Plume Behaviour. - Air Dispersion Model. - Stack Height.	
Four	**Air pollution Control Equipment** - Gravitational settling chamber (Advantage/ Disadvantage/ Design) - Cyclone (Advantage/ Disadvantage/ Design) - Fabric Filter Advantage/ Disadvantage) - Electrostatic Precipitator Advantage/ Disadvantage/ Design) - Wet Scrubber Advantage/ Disadvantage/ Design)	

6. تلوث التربة (Soil Pollution)

Competitive Exam - Post-Graduate (MSc Program) – 2025-2026		
▪ Principles of Soil Science: Abdullah Najm Al-Ani (1980) ▪ Soil Mechanics: Mohammed Omar Al-Asho (1980) ▪ Groundwater pollution: Dr. Ahmed Al-Khatib (1993)		
Chapter	**Subject**	**Remarks**
One	**Soil mechanics** - Definition of soil and its components. - Physical properties of the soil. - Soil gravimetric and volumetric relationships. - Atterberg Limit. - The classification of soils is according to the unified classification system and the method of the Mississippi triangle. - Flow of water through the soil.	
Two	**Chemical properties of soil** - Ion exchange capacity, soil acidity, importance and methods of measuring it. - Mineral colloids, Organic colloids. - Salinity and alkalinity in soil, classification of soils affected by salts, determination of soil salinity. - Osmotic tension, reclamation of soils affected by salts. - Soil biological properties, leading groups of soil biology. - Carbon-nitrogen cycle in nature Carbon-to-nitrogen ratio.	

Three	**Soil and Groundwater pollution** - Pollution by chemical sources. - Uses of pollutants and their environmental effects on soil and groundwater. - Qualitative characteristics of pesticides. - Heavy and light metals in the soil, their uses, and their readiness to move to the soil and groundwater system.	

7. الإحصاء الهندسي (Engineering Statistics)

Competitive Exam - Post-Graduate (MSc Program) – 2025-2026		
Elementary Statistics: A Step-by-Step Approach, by Allan G. Bluman, 6th edition, 2014		
Chapter	**Subject**	**Remarks**
One	The nature of statistics and data description	
Two	Frequency distribution and graphs.	
Three	Measures of central tendency	
Four	Measures of dispersion	
Five	Skewness & Kurtosis Measures	
Six	Probability theory	
Seven	Probability distribution. - Binomial distribution - Poisson distribution - Normal distribution	
Eight	Correlation and regression.	
Nine	Test of hypothesis	
Ten	Analysis of variance	

8. ميكانيك الموائع (Fluid Mechanics)

Competitive Exam - Post-Graduate (MSc Program) – 2025-2026		
Elementary Fluid Mechanics – By John. K. Vennard, 1940 Fluid Mechanics – By Frank M. White, 2016		
Chapter	**Subject**	**Remarks**
One	**Introduction and Fundamentals** 1- The Concept of Fluid. 2- Dimensions and Units. 3- Development of Fluid Mechanics. 4- Physical Properties of the Fluid State (Density, Specific Weight, Specific Volume, and Specific Gravity, Compressibility, Elasticity, Viscosity, Surface Tension and Capillarity).	
Two	**Fluid Statics** 1- Pressure-Density-Height Relationships. 2- Absolute and Gage Pressures. 3- Manometry. 4- Forces on Submerged Plane Surfaces. 5- Forces on Submerged Curved Surfaces. 6- Buoyancy and Stability.	
Three	**The Flow of an Ideal Fluid** 1- Classification of Flow in Pipes and Open Channels. 2- Mass Conservation Law (Continuity Equation). 3- Energy Conservation Law (Bernoulli's and Euler's Equation). 4- Momentum Conservation Law. 5- Energy Relationships. 6- Applications of Bernoulli's Equation.	
Four	**The Flow of a Real Fluid in Pipes** 1- Energy Equation in Real Fluid. 2- Total Friction Losses in Pipes (Major and Minor Losses). 3- Pipe-Friction Problems. 4- Flow Through Branching Pipes (Series and Parallel Pipe Systems). 5- Pumps and Turbines.	

Five	**Dimensional Analysis** 1- Definition. 2- Buckingham Pi Theorem.	
Six	**Flow in Open Channels** 1- Types of Open Channels. 2- Geometry Properties. 3- Manning Equation	