

المحتوي العلمي

2023-2022

إدارة الدراسات العليا والبحوث



كلية
الهندسة

المحتوي العلمي لامتحان القبول للطلاب المتقدمين لدرجة الماجستير والدكتوراه
لأئحة 2020

علي الطالب مراجعة القسم العلمي في موعد الاختبار وطريقته ومكان الاختبار

المحتوي العلمي

2023-2022

ELECTRONICS AND COMMUNICATION ENGINEERING TOPICS

هندسة الإلكترونيات
هندسة الاتصالات
معالجة الصور والاشارات
الهوائيات والفتونيات

إدارة لدراسات العليا والبحوث



Electronics and Communication
Engineering



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ROADS AND AIRPORTS ENGINEERING

MSc Topic

- Characterization of unbound granular materials and subgrades.
- Aggregate and asphalt binder characterization .
- Hot-mix asphalt design by Marshall and Super - pave.
- Structural design of asphalt pavements .
- Stresses in flexible pavements.
- Hot - mix asphalt plants.
- Pavement Rehabilitation Techniques.
- Laboratory testing for evaluating pavement performance.

Ph.D Topic

- Connected vehicles influence on pavement performance .
- Sustainable pavements .
- Balanced mix design .
- Use of recycled materials and by products in pavement construction.
- Mechanistic empirical pavement materials.
- Permanent deformation of pavement layers
- Pavement Management System.



Public Works Engineering



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2023-2022

هندسة النقل والمرور

MSc Topic

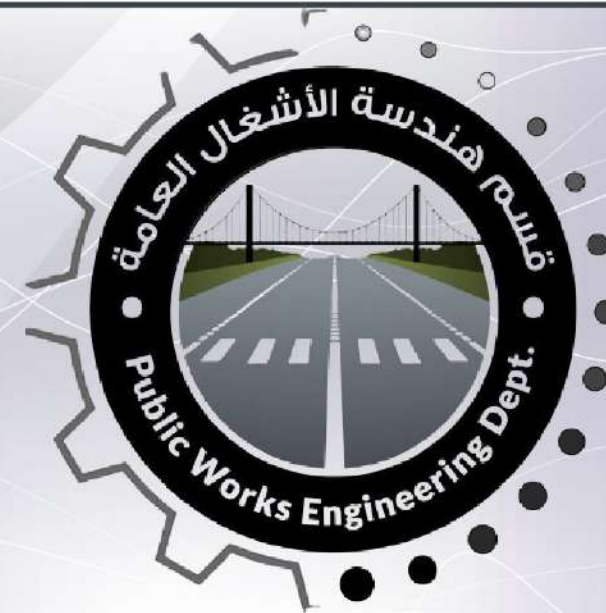
أنظمة النقل الذكية
تخطيط النقل الحضري
تحديد واختيار أنسب المسارات للرحلات الحضرية
تقييم الأثر البيئي لمشروعات النقل
تخطيط محطات الحاويات البحرية والداخلية
نسبة التحول إلى النقل بالحاويات وتأثيره علي حركة الملاحة بقناة السويس

Ph.D Topic

التحكم في التقاطعات
تطبيقات الحاسب المتقدمة في هندسة النقل والمرور
تحليل وتقدير المسببات والتكاليف الاقتصادية لحوادث الطرق في مصر
سلوك السائقين عند التقاطعات العامة بالاشارات الضوئية
لوجيستية نقل وتداول الحاويات
تأثير زيادة أبعاد السفن البحرية علي الممرات المائية العالمية



Public Works Engineering



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2023-2022

Sanitary Engineering

MSc Topic

- Water Network.
- Water treatment and supply
- Wastewater treatment
- Sewer networks
- Environmental science

Ph.D Topic

- Advanced water treatment
- Environmental chemistry
- Wastewater treatment
- Industrial wastewater treatment
- Sludge treatment

إدارة لدراسات العليا والبحوث



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هندسة المساحة

MSc Topic

نظرية أقل مجموع للمربعات
المساحة الجيوديسية وطرق ضبط الشبكات الجيوديسية
المساحة التصويرية
نظم الإحداثيات
إسقاط الخرائط

Ph.D Topic

المساحة التصويرية والاستشعار عن بعد
تطبيقات وأرصدة GPS في تحديد النقط الجيوديسية وطرق الرصد
تطبيقات نظرية أقل مجموع للمربعات في تحديد دقة المواضيع
الجيوديسية للنقط الارضية
النظم الإحصائية المختلفة لمعالجة نتائج الأرصاد
الجيوديسيا المتقدمة



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رياضيات هندسية

MSc Topic

سوف يشتمل الأمتحان علي المحتوى العلمي لمقررات رياضيات ١ (تفاضل)
وررياضيات ٢ (تكامل) ورياضيات ٣ (معادلات تفاضلية)

Ph.D Topic

سوف يشتمل الأمتحان علي المحتوى العلمي والتحليل العددي للمعادلات
BAS521 (لمقررات المعادلات التفاضلية الجزئية) **BAS613**

فيزياء هندسية

MSc Topic

سوف يشتمل الأمتحان علي المحتوى العلمي لمقررات الفيزياء
الرياضية والفيزياء الحاسوبية والفيزياء التجريبية والفيزياء البصرية
والفيزياء الحيوية

Ph.D Topic

سوف يشتمل الأمتحان علي المحتوى العلمي لمقررات ميكانيكا الكم
وميكانيكا الكم المتقدمة .



Mathematics
& Engineering-Physics



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2023-2022

TOPICS

- Importance of Engineering Tolerances in Design and Manufacturing.
- Optimization of Mechanical Structures.
- Mechanical Design of Energy Harvesting System.
- Design of Integrated Mechatronics Systems.
- Fracture and Damage Mechanics.
- Fracture and Damage Monitoring and Prevention.
- Criteria for Manufacturing Process Selection.
- Economics of Additive Manufacturing vs Conventional Manufacturing.
- Advanced Robotics and Automation.
- Nanomanufacturing.
- Sustainable Manufacturing.
- Materials Informatics.
- Biomechanics.
- Manufacturing information system.
- Machining parameters and optimization approaches.
- New alloys for mechanical applications.
- Smart materials / composites.



Production and Mechanical Design Engineering



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المحتوي العلمي

2023-2022

MSc Topics

- Types of control systems.
- Modeling of automatic control systems.
- Block reduction of control system.

Modern Control Engineering (5th Edition), Author(s): Katsuhiko Ogata.

- Chapter 1 in "Explorations in Artificial Intelligence and Machine Learning",
https://www.routledge.com/rsc/downloads/AI_FreeBook.pdf.

Ph.D Topics

Time response analysis of first and second order systems.

- State space representation.

Modern Control Engineering (5th Edition), Author(s): Katsuhiko Ogata.

- Chapter 6 : NEURAL NETWORKS AND DEEP LEARNING in "Explorations in Artificial Intelligence and Machine Learning",
https://www.routledge.com/rsc/downloads/AI_FreeBook.pdf.



Computer engineering and control systems



علي الطالب مراجعة القسم العلمي في موعد الاختبار وطريقته ومكان الاختبار

المحتوي العلمي

2023-2022

MSc Topics

- Heading up structure .
- Open channel flow .
- Port planning .
- Coastal protection works .

Ph.D Topics

- Hydraulics of Estuaries .
- Water Resources .

إدارة الدراسات العليا والبحوث



Irrigation And Hydraulic Engineering



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2023-2022

موضوعات امتحان القبول

اسس البحث العلمي في العمارة وال عمران

عمارة وعمران المستقبل

الفكر المستخدم في العمارة وال عمران (مستوي التخطيط العمراني -
التصميم الحضري -التصميم المعماري-تقنيات البناء -الخ)

الثقافة المعمارية العامة (رواد الفكر المعماري -المشروعات المعمارية
والعمرانية المعاصرة --- الخ)

دراسات في فكر وابداعات رواد العمارة المعاصرة (محلي وعالمي)



Architectural Engineering



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المحتوي العلمي

2023-2022

TOPICS FOR CANDIDACY (ADMISSION) EXAM IN TEXTILE ENGINEERING

- Advances in yarn spinning technology.
- Mechanics of plied yarns.
- Production and properties of technical fabrics.
- Fabric tailorability.
- Balancing of weaving preparation and weaving production line queue.
- Advances in Knitting technology.
- Wet processing of cellulosic fibres.
- Developing weaving preparations and weaving processes.
- Modeling woven fabrics.
- The recent advances in bulletproof textiles .
- Geotextile filtration principles, practices and problems .
- Principle of electrostatic flocked fabrics and their manufacture .
- An introduction to composite materials .



Textile Engineering



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علي الطالب مراجعة القسم العلمي في موعد الاختبار وطريقته ومكان الاختبار

المحتوي العلمي

2023-2022

Topics of MSc

Power System Part

- Power system quality
- Power flow analysis
- System stability analysis
- Compensation in power system
- Active and reactive power control

Electrical Machine Part

- Different control techniques of induction motor.
- Induction Generator: Operation and characteristics.
- Synchronous Generator: Operation with infinite busbar and paralleled generators.

Power Electronics Part

- AC / DC Converters
- AC / AC Converters
- DC / DC Converters
- DC / AC Converters
- Resonant Converters
- Application of Power Electronics in Renewable Energy Systems



Electrical Engineering



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علي الطالب مراجعة القسم العلمي
في موعد الاختبار وطريقته ومكان الاختبار

المحتوي العلمي

2023-2022

Topics of Ph.D

Renewable Energy Part

- Basics of Renewable energy: definition, importance, and challenges.
- Types of renewable energy systems:
 - * Wind energy power
 - * Photovoltaic systems
 - * Solar Thermal systems
 - * Biomass energy
 - * Geothermal power plants
 - * Mini-hydro and Pumped storage hydro power plants
- Current and future status of renewable energy in Egypt

Power System Part

- Fault analysis
- Power flow
- Transient stability
- Economic dispatch
- Voltage control



Electrical Engineering



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علي الطالب مراجعة القسم العلمي في موعد الاختبار وطريقته ومكان الاختبار

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2023-2022

Topics of Ph.D

Power System Protection Part

- Various types of the electromagnetic relays
- The basic principles of microprocessor-based relays.
- Protection of distribution systems
- The synchronous generator protection
- The transformer protection
- The power system protection when connected to DG
- Busbar, capacitors, and reactors protection

Electrical Machine Part

- Short notes about the types of electrical machine (conventional and special).
- Short notes about different control methods (conventional and advanced) for induction motor.
- Switched reluctance motor
- Field oriented control



Electrical Engineering



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Topics of Ph.D

Power Electronics Part

- List the characteristics of ideal power switch.
- What are the types of power electronics circuits? Explain and mention some applications for each one.
- Compare in table between center tap and bridge single-phase rectifiers.
- Why it is needed to use a Free-Wheeling Diode (FWD) in some applications of power electronics circuits?
- Discuss the basic principles of DC choppers, and state its different types?
- State the different types of inverters?
- Explain what the term Pulse Width Modulation (PWM) means, and how do it?
- Compare in table between the three-phase voltage source inverters (VSI) and current source inverters (CSI)?



Electrical Engineering



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المحتوي العلمي

2023-2022

SEMINAR TOPICS

(a) Theory of Structures

1. Performance-based design of bridges and buildings, including tall buildings;
2. Collapse simulation studies for reinforced concrete buildings;
3. Seismic rehabilitation of buildings and bridges;
4. Applications and modeling of components and systems constructed with composite materials;
5. Behavior of RC Structures subjected to blasting;
6. Finite element model for double composite beam;
7. Improvement and retrofitting of existing buildings;
8. Static and dynamic analysis of cable-stayed bridges, suspension-bridges, and cable nets subjected to wind and earthquakes;
9. Dynamic Collapse Simulation of RC Frame under Extreme Earthquake Loadings;
10. Progressive Collapse in Reinforced Concrete Buildings;
11. Structural System Selection Using Performance-Based Design;
12. Failure Mechanism of Column Components and Systems of Bridges;
13. Effects of Local Damage on Global Seismic Response of Bridge;
14. Post-Tensioned Structural Concrete Bridge Piers;
15. Seismic Performance of Reinforced Concrete Bridge Columns Subjected to Combined Loading Including Torsion.



Structural Engineering



Presentation in one of the topics

The exam is an Seminar

OK

المحتوي العلمي

2023-2022

SEMINAR TOPICS

(b) Concrete Structures

16. Design principles for structural quality;
17. Design for robust structures;
18. Role of conceptual design;
19. Design of reinforced concrete dapped end;
20. Design of reinforced concrete shallow beams with openings;
21. Design of reinforced concrete deep beams with openings;
22. Design of reinforced concrete beam-column connections;
23. Design of end block of prestressed concrete beams;
24. Design of reinforced concrete construction joints;
25. Design of reinforced concrete corbels;
26. Design of pile caps;
27. Design of reinforced concrete ledge beams;
28. Tracing flow of forces in reinforced concrete discontinuity regions;
29. Restrained stresses in reinforced concrete structures;
30. Modeling of temperature variation in deep reinforced concrete members;
31. Design of reinforced concrete water structures;
32. Analysis and design of R/C surfaces of revolutions;
33. Design and analysis of R/C cylindrical shells;
34. Analysis and design of R/C stairs;
35. Flexural analysis of prestressed concrete beams;
36. Serviceability limit states of reinforced concrete;
37. Principles of reliable seismic design;
38. Design for earthquakes using static equivalent lateral force method;
39. Design of beam-column connections of R/C frames in seismic regions



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SEMINAR TOPICS

(c) Steel Structures

40. Types of Steel Structures;
41. Design of Steel Truss Elements;
42. Composite Steel Structures;
43. Mero System;
44. Types of Steel Connections;
45. Cold Formed Steel Structures;
46. Analysis of Steel-Concrete Composite Beams;
47. Design of Steel Elements Subject to Axial Compression and Bending;
48. Analysis of Steel Base Connections;
49. Analysis and Design of Composite Steel Columns and Beams
51. Behavior of stiffened concrete filled steel tube (CFST) and concrete filled double tube (CFDT) columns;
52. Behavior of CFDT columns using different types of concrete;
53. Behavior of CFST and CFDT columns under fire and their post fire behavior;
54. Behavior of composite beams and slab under fire and their post fire behavior;
55. Steel material usage in new renewable energy structures;
56. Using steel replaceable structural fuse element (SRSFE) in resisting earthquakes in structure toward sustainable building and cities;
57. Behavior of composite beams using demountable shear connectors;
58. Using of machine learning in steel structure design



Structural Engineering



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2023-2022

(d) Soil Mechanics and Foundation Engineering

59. Soil classification;
60. Stresses in soil;
61. Soil Settlement;
62. Soil Shear strength;
63. Soil Compaction;
64. Earth pressure;
65. Slope stability in soil;
66. Soil Bearing capacity;
67. Shallow foundation; Deep foundation;
68. Shoring – Types and systems
69. Sheet piles

SEMINAR TOPICS

(e) Strength of Material

70. Geopolymer concrete;
71. Self-compacting concrete;
72. High-performance concrete;
73. Ultra-high-performance concrete;
74. Self-healing concrete;
75. Lightweight concrete;
76. Eco-efficient concrete;
78. Nano-technology in construction;
79. Corrosion of steel in concrete;
80. Sustainability of concrete;
81. Durability of concrete;
82. Fibre-reinforced concrete;
83. Admixtures;
84. Non-destructive Tests;



Structural Engineering



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6. Construction Project Management

6.1 Master's degree

84. Green Buildings and Sustainability.
85. Infrastructure and Asset Management.
86. Construction Digitization.
87. Block chain and Data analysis and its application in construction.
88. Green Technology application in construction.
89. Facilities management.
90. Comparative assessment of sustainability rating systems.
91. Productivity and its methods of improvement and assessment.
92. Smart Contracts.
93. Competitive bidding models in construction.
94. Delay analysis methodologies.
95. Efficient Scheduling and Control of Multiple projects.
96. Off-site manufacturing.
97. Infrastructure resilience evaluation.
98. Facilities management and virtual reality methods and applications.
99. Game theory applications in construction.
100. Decision support systems for infrastructure and asset management.
101. Optimizations of resource scheduling using heuristic and mathematical methods.
102. Mark-up estimations: modeling and optimization.
103. Time & cost optimization in construction.
104. Risk management.
105. Design of construction operations.
106. Construction site layout planning.
107. Health and safety planning: Job hazard analysis.
108. Companies cash flow.
109. Earned value management challenges and solutions.



Structural Engineering



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علي الطالب مراجعة القسم العلمي في موعد الاختبار وطريقته ومكان الاختبار

6.2 Doctorate degree

110. Construction Digitization.
111. Construction 4, the role of Building Information Modelling.
112. Disaster Recovery of construction and public works projects.
113. Social Network Analysis and its application in the construction industry.
114. Innovations in Construction.
115. The Game theory and its application in the construction industry.
116. Innovative rapid construction/reconstruction methods.
117. Construction Progress Tracking using Metaverse Technology.
118. Block chain and Data analysis and its application in construction.
119. Green Technology application in construction.
120. Applications of Social Network Analysis in construction.
121. Profit allocation, risk sharing in joint venture or PPP projects using Game theory.
122. Construction Payment Automation using VR, Blockchain and Smart Contract.
123. BIM-Based simulation of evacuation strategies.



Structural Engineering



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2023-2022

TOPICS

- Pneumatic control systems applications.
- Hydraulic control systems applications.
- Autotronic systems.
- Control in power stations and air conditioning systems.
- Micro & nano mechatronics.
- Applications of advanced materials in mechatronics.
- Advanced Robotics Applications.
- Machine Learning.
- Sensing.
- Modern Control Systems.
- Computer Vision.
- Advanced Programming.
- The internet of Things.
- Embedded Systems.
- Computer-machine control.



Mechatronics Engineering



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2023-2022

TOPICS

- Internet of Medical Things (IoMT).
- Bioprinting and Tissue Engineering.
- Improving Medical Imaging.
- Surgical Robotics.
- Medical VR/AR.
- Medical Data Classifications using Different Optimization Techniques.
- Improving Assistive Technologies.
- Artificial Intelligence Applications in Computer aided Design.
- Telesurgery.
- Telemedicine.
- Biomechanics of Human Joints.
- Biomechanics of orthodontics.
- Biomaterials and their applications in Human Body.
- Microfluidics in Biomedical Applications.
- Point of Care/ Lab on a chip System.



Biomedical Engineering



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ENVIRONMENTAL ENGINEERING TOPICS

- waste water treatment
- material recycling technology
- solid waste management
- global environment problems
- environmental problems caused by burning fossil fuels
- environmental mitigation and monitoring
- hazardous waste management
- geologic storage of co2 leakage pathways and environmental risks
- air pollution and it's control
- environmental economic impacts
- basic concepts for assessing environmental impacts
- global warming & sea level rise issues
- co-firing biomass with coal for power generation
- environmental policy & sustainability
- advanced technologies towards zero emissions

إدارة لدراسات العليا والبحوث



Environmental Engineering



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علي الطالب مراجعة القسم العلمي في موعد الاختبار وطريقته ومكان الاختبار