جامعة القاهرة

كلية الحاسبات والذكاء الإصطناعي

<u>**قسم بحوث العمليات ودعم القرار**</u>

عزيزى الطالب

أهلاً بك لدراسة الدكتوراه فى تخصص بحوث العمليات ونظم دعم القرار بأعتماد الحاسب. بعد قراءاتك للقواعد والمحتويات التفصيلية لهذه الدرجة سوف تتبين أنه قد روعى فى تصميمها أن تشمل معظم الموضوعات التى تدخل فى نطاق التخصص، إضافة إلى توجهاتها الحديثة من أجل بما ضمان <u>خريجاً</u> عصرياً فى هذا المجال . وإليك هذه الملاحظات لكى تساعدك فى أداء الإمتحان بنجاح بإذن الله .

1- يعتبر هذا الإختبار مؤشـرا على قدرتك وخليفتك العلمية الملائمة لأستكمال دراستك من أجل الحصـول على درجه الدكتوراه بشـكل عام، وهو فى نفس الوقت يمثل شرط ضرورى للالتحاق بالسنه التمهيديه لدراسه الدكتوراه.

2- قائمةالمراجع مقترحة وليست بالضرورة مُلزمه ويمكنك الاستعانه بغيرها بشرط تغطيتك للموضوعات المذكورة فى كل المجالات.

3- ان الإمتحان يركز على المفاهيم الأسـاسـية لكل تخصـص وشـموليه معرفتك به وقدرتك على التفاعل مع أسـاليبة الكمية، ونماذجة الرياضـية، ومجالات تطبيقة، وتكنولوچيا المعلومات والحاسبات الخاصة بة، إضافة إلى قياس قدراتك على التعامل مع الأسئلة بشكل يعكس فهمك لأبعاده المتعددة والمتشابكة.

..... مع أطيب تمنياتنا بالتوفيق .....

اداره القسم

FIRST EXAMINATION PAPER CONTENTS
OR / DSS TECHNIQUES

A- Optimization Techniques (Compulsory Section) :

   1- Linear Programming (LP)
- Simplex methods with computational details
- Revised simplex method
- Duality theory and it Economical applications
- Dual simplex method
- Parametric and post optimal analysis
- Transportation & Assignment problems
- Interior – Point Polynomial Analysis

   2- Non – Linear Programming (NLP)
- Classical unconstrained optimization
- Optimum seeking by experimentation
- LaGrange multipliers and Kuhn – Tucker theory
- Convex and concave functions
- Algorithms for linearly constrained problem
- Algorithms for non – linearly constrained problems

   3- Integer – Programming (IP)
- Cutting Plane Algorithm
- Branch and bound Algorithm
  IP Formulations
- Knapsack problem
- Covering problem
- Traveling salesman problem

- Job- shop scheduling problem

4- **Dynamic Programming (DP)**
  - Analysis of Dynamic concepts
  - Convex and concave cost functions
  - Dynamic optimization principals

5- **Multiple Objective Programming (MOP)**
  - Goal Programming (GP) &applications
  - Multiple Objective DM (MODM) , concept &applications
  - Multi-Attribute DM (MADM) / MCDM , concept &applications

B- **Intelligent Optimization Techniques**
  1- Neural Networks & Genetics   (Concepts & Application in OR /DS)
  2- Ant Colony & Swarm   (Concepts & Application in OR /DS)
  3- Simulating Annealing & Taboo Search
                                   (Concepts & Application in OR /DS)
  4- Hybrid Meta Heuristics   (Concepts & Application in OR /DS)
  5- Algorithms & Heuristics Fundamental

المراجع المقترحة :

Topic	Book Title	Author	Year
General Operations Research	Principle of Operations Research	H.Wagner	1978
	Optimization Operations Research	R.L.Rardin	1998
	Operations Research: An Introduction	H. Taha	2017
	Operations Research: Applications and Algorithms	W. L. Winston	2003
LP	Linear Programming 2: Theory and Extensions	George B. Dantzig , Mukund N. Thapa	2003
	Linear Programming & its Applications	H. A. Eiselt · C.-L. Sandblom	2007
NLP	Nonlinear Programming	Mokhtar S. Bazaraa	1979
	Convex Optimization	Stephen Boyd , Lieven Vandenberghe	2004
IP	Integer Programming	H .taha	1984
	Foundations of Integer Programming	K.Mathun , H Selkin	1989
	INTEGER PROGRAMMING	John K. Karlof	2006
	NONLINEAR INTEGER PROGRAMMING	DUAN LI , XIAOLING SUN	2006
DP	APPROXI MATE DYNAMIC PROGRAMMING	Warren B. Powell	2007

	Solving the Curses of Dimensionality		
MOP	Goal Programming For Decision Analysis	S. Lee	1978
	Multiple Criteria Optimization	R.Steuer	1986
	MULTIPLE CRITERIA OPTIMIZATION: STATE OF THE ART ANNOTATED BIBLIOGRAPHIC SURVEYS	MATTHIAS EHRGOTT , XAVIER GANDIBLEUX	2002
Stochastic Programming	Introduction to Stochastic Programming	John R. Birge , Fran¸cois Louveaux	1997
Intelligent Opt. & Heuristic	Evolutionary Algorithms in Theory & Practice	T.Back	1996
	Computational Intelligence An Introduction Second Edition	Andries P. Engelbrecht	2007
	Computational Intelligence: A Compendium	John Fulcher , Lakhmi C. Jain (Eds.)	2008
	The EM Algorithm and Related Statistical Models	Michiko Wa tana be , Kazunori Yamaguchi	2004
	Modern Heuristic Optimization Techniques	Kwang Y. Lee , Mohamed A. El-Sharkawi	2008
	Handbook of Metaheuristics	M. Gendreau and J.Y.Potvin	

Second Examination Paper Contents
OR / DSS Models & Modeling Applicatio

Section-A :

1- **Modeling Capabilities**
   Formulate any given Problem or case study as a mathematical programming , Simulation or network model.

2- **Decision Support system**
   - Origin and Initiation of Decision Support Systems (DSS).
   - Conceptual Model of a Computer aided DSS.
   - DSS as a computer (or management) support Systems.
   - Information Technologies associated with DSS.
   - Taxonomy and Classification of DSS.
   - Characteristics of Special and General purpose DSS.
   - Illustrative Application of General and Special Purpose DSS.
   - Design and Components of data-centered DSS.
   - Design and Components of Model-centered DSS.
   - Concepts and technologies of Business Intelligent.
   - Characteristics of a Knowledge-based DSS.
   - Role of Computer modeling languages in DSS.
   - Classification and main features of a modeling language.
   - Collaborative information systems and Group DSS (GDSS).

- Knowledge Management and DSS.

3- <u>Simulation</u>
- Discrete event simulation modeling.
- Fixed time advance computer simulation.
- Variable time advance simulation.
- Timing routines in Simulation.
- Event Scheduling modeling.
- Process interaction modeling.
- Computer simulation modeling languages.
- Arena simulation modeling language.
- Generation of random deviate & Mont Carlo Methods.
- Continuous system simulation .
- Experimental aspects of simulation analysis.
- Design of simulation experiment & sample size determination.
- Experimental Optimization via simulation .

<u>Section-B</u> :

1- <u>Project Management & Network Analysis</u>
- Time analysis
- Cost Analysis
- Resource Analysis
- Shortest Path Techniques
- Network Flows

2- <u>Production & Inventory Management</u>
  - Inventory Deterministic Models
  - Inventory Probabilistic Models
  - MRP / ABC / ERP Systems

3- <u>Queuing Models</u>
  - Exponential Distribution
  - Poisson Process
  - Exponential Models
  - Birth & Death Processes
  - Continuous – Time Markov Chains
  - Renewal Theory & Its Application

4- <u>Engineering Economy</u>
  - Interest , Interest Factors and Equivalence
  - Depreciation Techniques & Strategies
  - Income Tax Consideration
  - Deterministic investment Analysis including a single & multiple projects .
  - Investment Analysis under risk and uncertainty

5- <u>Crisis & Strategic& Future Management</u>

Topic	Book Name	Author	Year
Modeling Capabilities	Model Building in Mathematical Programming	H.B.Williams	1978
DSS	Decision Support for Management	R.H.Sprague , H.J.Watson	1996
	Decision Support Systems & Intelligent System	E.Turban , J.E.Aronon	1998
	Handbook on Decision Support Systems 1: Basic Themes	Frada Burstein, Clyde W. Holsapple	2008
	Handbook on Decision Support Systems 2 Variations	Frada Burstein , Clyde W. Holsapple	2008
	Encyclopedia of Decision Making and Decision Support Technologies	Frederic Adam & Patrick Humphreys	
Simulation	Simulation Modeling And Analysis with Arena	Tayfur Altiok , Benjamin Melamed	2007
	Handbook in OR & MS, Vol. 13 - Simulation	S.G. Henderson and B.L. Nelson (Eds.)	2006
	Simulation Modeling and Analysis	Averill M. Law	
	Introduction to Discrete Event Simulation and Agent-based Modeling	Theodore T. Allen	
	Project Management with CPM & PERT	J.J. Moder	1983

Project Manag. & Network Analysis	Project Management Tech in Planning & Controlling ,	H.N.Ahuja	1994
	Project Management for Business and Engineering Principles and Practice 2 N D E D I T I O N	John M. Nicholas	2004
	Fundamentals of Network Analysis	Diaz & Philips	1990
Production & Inventory Manag.	Decision Systems for Inventory Management & Production Planning	E.Silver	1985
	Handbook of Production Management Methods	Gideon Halevi	2001
	Production / Operation Management	W.J.Stevenson	1996
	Best Practice in Inventory Management, Second Edition	Tony Wild	2002
Queuing Models	Fundamental Of Queuing , Theory	Gross & Harsis	1974
	Introduction to stochastic Models	S.Ross	1978
	Vacation Queuing Models: Theory and Applications	Naishuo Tian, Zhe George Zhang	2006
Engineering Economy	Engineering Economic	E.P.Degarmo , W.G. Sullivan	1997
	Engineering Economic	L.T.Blank , A .J. Targuin	1998
Crisis Manag.	Crisis Management Planning and Execution	Edward S. Devlin	2006