1 DECEMBRIE 1918 UNIVERSITY OF ALBA IULIA
FACULTY OF EXACT SCİENCES AND ENGİNEERİNG
DEPARTAMENT OF EXACT SCİENCES AND ENGİNEERİNG

The topics for the graduation exam, Subject: *Computer Science* 2016

Part I: Programming:

1. Characterıstıcs of algorithms. Stages of development of algorithms. Methods of designing algorithms. Top-down, Bottom Up.
2. Structured programming. Prınciples.
3. Basic algorithms
    a. changing values of two variables
    b. Browsing the elements of a given set
    c. implementation of operators ∈& ∃
4. Methods and technıques of development algorithms
    a. The Greedy Method
    b. The Backtracking Method
    c. *The Divide et Impera* Method
    d. Dynamic programming
5. Data structures
    a. Inhomogeneous structures (item, file)
    b. Array: operations with arrays. Sorting Methods
    c. Linked links
    d. Binary search trees
    e. Graphs
6. Modular programming. Definition and parameters of sub- algorithms.
7. Object- oriented Programming. Concepts and principles:
    a. Class. Abstracting method.
    b. Object. Embedded
    c. Fıelds
    d. Operations
    e. Classes relations.
    f. Inheritance
    g. Polymorphism

Part II: Data bases

1. General principles.
    a. Basic concepts;
    b. Data base approach;
    c. Levels of abstraction in DBMS. Logical database. Concept of data base
2. Design of data base;
    a. Modelling of logical data;
    b. Entity-relation conceptual model
    c. Desıred and functional properties in DBMS
3. Mapping the relational model;
4. Normalisation;
    a. Normal forms FN1, FN2, FN3
    b. Database schema.
5. Relational Algebra;

a. Primary and secondary keys. Referential integrity

6. İmplementing of relational database
   a. Query of database (SELECT)

Part III: <u>Computer networks</u>

1. Classification of Computer Networks
2. Protocols. Network topologies
3. Standards. The necessity of Standards
4. ISO-OSI Model
5. Physical Layer. Data Link Layer. Network Layer. Transport Layer. Session Layer. Presentation Layer. Application Layer
6. TCP/IP Model
7. Comparison between OSI and TCP
8. TCP/IP Model. Network model and IEEE protocols.
9. Data transmission in a data link
10. Error security data
11. Network operation systems
12. Public Data Networks. Data services in GSM
13. Data compression
14. Wireless networks
15. Computer network security.

Recommended references

1. Domsa O., Algoritmica, Curs, Editura Didactica, 2002, Universitatea "1 Decembrie 1918", Alba Iulia
2. Rotar C., Algoritmi si structuri de date, Curs, Editura didactica, 2008, Universitatea "1 Decembrie 1918", Alba Iulia.
3. LOGOFATU D., ALGORITMI FUNDAMENTALI IN C ++: APLICATII, Iasi, Editura POLIROM, 2007.
4. Frentiu M., Motogna S., Lazar I., Prejmerean V., Elaborarea algoritmilor, Litografia Universitatii "Babes Bolyai", Cluj Napoca, 1998.
5. CORMEN T.H., LEISERSON E.C., RIVEST R.R., Introducere în algoritmi, Editura Libris Agora, 2000 (traducere în limba româna).
6. Stroustrup B.: The C++ Programming Language, Adisson-Wesley, 3nd edition, 1997
7. Schildt H., C++ Manual complet, Teora, 2000
8. Bruce Eckel: Thinking in C++, 2nd Edition , Thinking in Java, 3rd Edition
9. Olteanu E., Proiectarea sistemelor de gestiune a bazelor de date, Aeternitas, 2006.
10. LUNGU, I., BODEA, C., Baze de date: organizare, proiectare si implementare , ALL EDUCATIONAL, BUCURESTI, 1995
11. CONNOLLY T., BEGG C. , STRACHAN A., BAZE DE DATE. PROIECTARE, IMPLEMENTARE, GESTIONARE TEORA, BUCURESTI, 2001
12. KORTH H. F., SILBERSCHATZ A. "Database System Concepts"
13. EMILIAN CEUCA – RETELE DE CALCULATOARE SERIA DIDACTICA 2007
14. TANENBAUM, A.S., ``REŢELE DE CALCULATOARE, ED. 4", BYBLOS SRL, 2003

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