ITMO UNIVERSITY

MASTER'S DEGREE PROGRAM IN BUSINESS INFORMATION SYSTEMS

ENTRANCE EXAMINATION QUESTIONS

1. Process approach to management and enterprise modelling

2. Business process: definition, characteristics, features. Business process classifications.

3. Database normalization. Normal forms.

4. Procedural extensions in SQL - cursors, subprograms, triggers.

5. IT service management. characteristics of standards and frameworks for IT infrastructure management (ITIL, ISO20000, MOF): goals, scope, application domain.

6. TCP/IP Protocol Architecture Model: layers, purpose, data flow, protocol examples. TCP/IP addressing. IP addresses, IT-networks, TCP\UDP ports.

7. IP network connection. IP routing. Network Address Translation (NAT). Proxying.

8. Security in corporate networks at data link and network layers (VLAN, RADIUS, VPN)

9. Access control. ACL. Mandatory access control. Identification, Authentication, Authorization. Definitions, purpose, examples.

10. UML models and their representations: use, behavior, structure. Common properties and extension mechanisms - stereotypes, tagged values, constraints.

11. Diagram hierarchy in UML1 and UML2. Entities and relationships in UML.

12. UML structural modelling. Class diagram. Components and interfaces.

13. UML diagrams: use case, state machine, activity, sequence, communication.

14. Design patters and frameworks in UML.

15. Basic principles of Object-Oriented Programming (OOP).

16. Class definition, class types, members of class. Example using OOP language.

17. Principles of conditional constructs and loops. Example using OOP language.

18. Operating system kernel-wide design approaches: monolithic, layered, microkernel, other types.

19. Operating system process scheduling. Performance criteria and properties of scheduling disciplines, parameters of process scheduling. Preemptive and non-preemptive scheduling, guaranteed scheduling, multiple-level queues scheduling.

20. Interacting processes problems. Mutual exclusion algorithms. Dijkstra's semaphore. Semaphore solution to the producer–consumer problem.

21. Memory management techniques in operating system. Virtual memory and addresses translation. Memory allocation methods without usage of secondary storage. Paged virtual memory and Segmented virtual memory.

22. Smart spaces. Definition and examples of ubiquitous computing systems, Internet Of Things. Socio-cyber-physical systems. Semantic Web. OWL, RDF(S), SPARQL.

23. Data, information and knowledge. Definitions, differences, examples. Types of knowledge. Knowledge representation models. Classification, description, advantages and disadvantages. Knowledge management. Ontologies. Definition, examples, usage. Ontology editors.

24. Artificial neural networks. Model of neuron. Computational abilities of single neuron. Learning neuron. Multi-layer network. Advantages and disadvantages of neural networks. Feed-forward and back-propagation algorithms.

25. Recommender systems. Purpose and classification. Content recommender systems. Main architecture. Objects and user profile representation. Collaborative filtering systems. Similarity measure approach. Latent factor models approach. Normalization, ways of measuring similarity. Measuring quality of recommendations.

Practical Tasks

26. Developing program using Object-Oriented Programming language.

27. Business process modelling using IDEF0/IDEF3, BPMN or Aris eEPC

28. Modelling software architecture using UML.

29. Designing data architecture of information system component.

30. Writing SQL queries to a relational database according to SQL-92 standard.