**CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE**
FACULTY OF ECONOMICS AND MANAGEMENT
ENTRANCE EXAMINATIONS

**Information Technology 1 – Recommended time for completion : 50 minutes**

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1. **The following is typical for the Von Neumann architecture**
   A. The central unit of the computer containing the processor and disk memory, interactive processing of programmes, results are saved only in the registers.
   B. Joint internal memory for the data and programme, arithmetic-logical unit operated by the processor sequencer, results are saved in internal memory or registers.
   C. Data are saved in memory, the programme in the processor's registers, the computer run is carried out by one or more processors connected to the data bus
   D. Virtual memory, interactive processing of programme, individual parts of the computer are linked by data bus
   E. Data are saved in registers, programmes in the memory, computer run is carried out by the arithmetic-logical unit, the results are transferred on the output data bus

2. **When transferring data from the hard disk to the main memory by the technique of direct access, "the end of the data block transfer" event occurred. This event caused a disruption, which belongs to the category of:**
   A. Internal, expected, nonmaskable
   B. External, unexpected, synchronous
   C. Expected, synchronous, nonmaskable
   D. External, asynchronous, maskable
   E. Unexpected, synchronous, nonmaskable

3. **One of the following methods of representation is always used for the internal representation of whole numbers with which arithmetic instructions operate:**
   A. Direct code or code with a shifted zero or a supplementary code
   B. ASCII code or a direct code or a supplementary code.
   C. A code with a fixed base point, or a code with a moveable base point or UNICODE.
   D. A supplementary code or a code with a shifted base point.
   E. ASCII code or UNICODE.

4. **The code words A, B, C are coded in a 5-bit code as follows:  A(0 1 0 0 1), B(1 0 0 1 0) and C(1 1 0 1 1).  In order to make a code which codes only the words A, B, C, self-correcting for a mistake in a single bit, it is necessary:**
   A. Expand it by an odd or even parity
   B. Expand it by a total parity
   C. Expand it by at least four suitably selected bits
   D. Expand it by at least two suitably selected bits
   E. No need to do anything, the code is self-correcting already.

5. **The structured design of algorithm is described by these principles>**
   A. determinism, mechanism, finality, correctness
   B. Hierarchical breakdown, using only simple data types
   C. Sequence from the top down, using only one sequence, selection, iteration for the breakdown of a task into a simpler one
   D. Using all program structures: sequence, selection, iteration at least once in an algorithm and their implementation in a program language
   F. Determinism, finality, correctness and the sequence of the proposal from the top down.

6. **You can state the following about the algorithm represented in the following development diagram:**
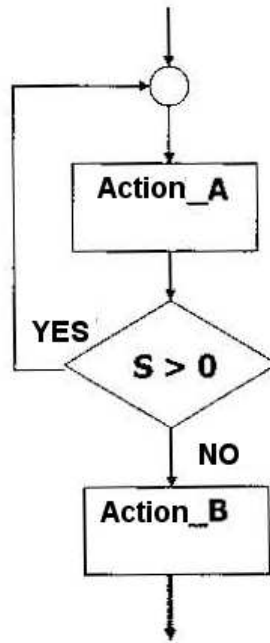


    A. Action_A is either carried out or not, in dependence on fulfilling the condition S
    B. Action_B is repeated in dependence on the condition S
    C. Action A and B will be alternating during operation
    D. Action B will always be carried out at least once
    E. The development diagram does not have to represent the correct algorithm.

7. **If the input is a field or a flow of records on employees, which includes the basic salary of the employee as positive whole number and if we want to determine what percentage of the company's employees earns a higher basic salary than the average of the basic salary in this company, the structured algorithm solving this task will include:**
    A. Two mutually embedded iterations (cycles) covering all employees, with the selection based on the level of the salary inside the internal cycle
    B. A sequence of two iterations (cycle) covering all employees, with the selection embedded inside the second cycle
    C. A selection, which will contain an iteration (cycle) covering all employees of the company in both alternatives
    D. A structured algorithm for the task solution does not exist because the input does not contain sufficient information for obtaining a required output.
    E. A structured algorithm will be realized by two parallel cycles, which will include leaps between both cycles in dependence on the salary level of an employee.

**8.   The disjunctive normal form of a logical equation f = ((a →b) ⊕ c) ∧ (a ∨ c) is:**
(the symbol → marks an implication, symbol ⊕ "excludes or" – XOR, ∧ a conjunction,
∨ a disjunction a – a negation)

A.  $(\neg b \wedge a) \vee (a \wedge b \wedge \neg c)$

B.  $(b \wedge \neg c) \vee (a \wedge \neg b \wedge c)$

C.  $(a \vee \neg c) \oplus (\neg a \vee \neg b \vee c)$

D.  $(\neg b \vee \neg c) \wedge (a \vee b) \wedge (b \vee c)$

E.  $a \wedge (\neg b \vee b \vee \neg c)$

**9.  We talk about a logical circuit when:**

    A.  We know the internal connection of the logical circuit and we search for the Boole functions, which describes its inputs.

    B.  We know the disjunctive normal form of the circuit and we are searching for its logical representation

    C.  We know the conjunctive normal form of the circuit and we are searching for its logical representation

    D.  We know the Boole functions which describe the outputs of the logical circuit and we are searching of its internal connections

    E.  We know the connections of the circuit and are searching for the disjunctive or conjunctive normal forms of its outputs.

**10. The following Table describes the behaviour of a logical circuit. Which one is it?**

| A | B | C | Y(t+1) |
|---|---|---|--------|
| 0 | 0 | 0 |        |
| 0 | 0 | 1 |        |
| 0 | 1 | 0 | Y(t)   |
| 0 | 1 | 1 |        |
| 1 | 0 | 0 |        |
| 1 | 0 | 1 | 0      |
| 1 | 1 | 0 | 1      |
| 1 | 1 | 1 | Y'(t)  |

    A.  An S-R flip-flop circuit, governed by a clock input

    B.  A demultiplexor 3 x 8 with an *enable* input

    C.  D flip-flop circuit with a clock input

    D.  The decoder 3 x 8 with an *enable* input

    E.  J-K flip-flop circuit with a clock input.

**11.** **A linear linked list is implemented by having its members arranged in pairs (element, link to the next member in the list) The last element of the list contains an empty link. If we wish to include a new element at the end of the list (as a last member) it is necessary:**

    A. Change a link to this element in all members in the list
    B. Include a new member at the beginning of the list and by means of an instruction to transfer the shift in the register on the right to gradually transfer to the end of the list.
    C. The structure is static, so that its expansion is not possible.
    D. Create a new element in the memory with an empty link and by means of a cycle through the existing list to find last element in the list and change link from empty value to link to new created element.
    E. Create a new element in the memory with an empty link and save its to the memory with index +1 higher than is number of members in current list.

**12.** **Which of the following data structures are completely linear**
    A. Queue and a tree
    B. Storage and a tree
    C. Tree and a field
    D. Queue and storage
    E. Tree and graph

**13.** **A stopage of processes in a multitask operational system occurs when:**
    A. Processes have exhausted the accessible virtual memory of the computer
    B. At least two processes are using the same data to which the access is not protected by the critical section
    C. Two processes are calling each other via a simplex channel. Thus the P1 process is calling a process P2 and the process P2 is calling the process P1.
    D. Two processes have the same priority and both are ready to start, while the blockage of the currently opearating process occurs\
    E. All running processes have reached a status of waiting for an event

**14.** **Access rights to file1 have been set by a command chmod 755 file1, which causes a setting up of access rights to "rwxr-xr-x". The file can be used by:**
    A. only its individual owner and superuser
    B.  only its individual owner or group owner
    C. any user
    D. only its group owner and superuser
    E. only the superuser

**15.** **When we can send the same report to two different objects, then the following is valid about these objects:**

    A. Objects are elements of a single MNOZINA
    B. Objects are polymorphous between themselves
    C. Objects are instances of classes that inherit from each other
    D. Objects are part of a single component
    E. Objects are interdependent

**16.** **When data classes of objects can be used for simplification of algorithms for the search, sorting and SEQUENCING of values?**
    A. Integer, Boolean, Magnitude
    B. File, Integer

  C. Stream, Integer
  D. Collection, Integer
  E. Model, View, Controller

## 17. What can be stated about the relational data model in database systems
  A. It allows the fastest obtaining answers to questions of all data models
  B. It uses direct linkage of records in the memory between themselves
  C. It is object oriented
  D. It enables transaction processing as a single data model
  E. The relational tables are linked only during the processing of the inquiry – this slows down the computation

## 18. When we have all tables of the relational databases with a simple primary key in the first normal form, then the following is valid:

  A. We must check the second normal form
  B. The tables are already automatically in the fifth normal form
  C. The tables are already automatically in the second normal form
  D. The tables are already automatically in the third and BCNF normal form
  E. More columns have to be added to the primary keys of some tables

## 19. The diagram of the data flow is:
  A. Diagram representing the processes and data storage
  B. Diagram representing the data entity and their links
  C. Diagram representing by means of statuses and junctions how the data entities change during the computation
  D. Diagram, which is object oriented
  E. Diagram which represents the computation algorithm

## 20. We can state the following about the waterfall/cascade model of the life cycle of the systems creation:
  A. It is good for planning sources and it follows the process of the project
  B. It is an obsolete mode of the information systems creation, which is now in little use
  C. It is a model which was developed for the object oriented creation of software
  D. It allows more precise systems task by means of the prototypes implementation
  E. It is ideal for utilization of the extreme programming technique.