NATIONAL OPEN UNIVERSITY OF NIGERIA
University Village, Plot 91, Cadastral Zone, NnamdiAzikiwe Express Way, Jabi, Abuja
FACULTY OF SCIENCES
JULY 2017 EXAMINATION

COURSE CODE:	**CIT721**
COURSE TITLE:	**Information System Design and Programming**
CREDIT UNITS:	**3**
TIME ALLOTED:	**2 HOURS, 30 MINUTES**
INSTRUCTION:	***Answer Question 1 and any other FOUR questions.***

1a. Explain How the performance of a system is measured.
3 marks
b. Differentiate between Deterministic and Probabilistic Systems.
2 marks
c. i. What is a model? 2 marks
ii. List three types of models
3 marks
d. Write a short note on the four basic steps of system analysis and design cycle. 8 marks
e. What are the range of skills and knowledge one must require to be a project manager on a SDLC project?
4 marks

2a. Differentiate between open and closed systems
4 marks
b. with the aid of a well labeled diagram differentiate between data and information 4 marks
c. Explain any four qualities of good information?
4 marks

3a. What are the functional categories of information systems?
4 marks
b. Enumerate three areas in which systems thinking has proven its value
3 marks
c. Write a short note on the three managerial approaches to SDLC
5 marks

4a. Mention three important reasons for system projects
3 marks

b. Explain two primary sources of project requests
3 marks

c. Describe the steps involved in Cost Benefit Analysis
6 marks

5a. what is a Conversion Plan. How does it differ from Implementation Plan?
4 marks

b. Describe the difference between a system flowchart and a program flowchart.
4 marks

c. Under what circumstances is a decision table preferred over a flowchart?
4 marks

6a. Write a short note on Assembly languages
3 marks

b. Discuss the benefits of Rapid Application Development
3 marks

c. Explainthe categories of risks to information system projects
3 marks

d. enumerate the three types of database models
3 marks

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Examination Marking Scheme
Course Code: CIT 721

1a. Theperformance of a system is measured using two factors:
Effectiveness: The degree to which set goals are achieved. It is therefore concerned with the results or the outputs of a system.
Efficiency: A measure of the use of inputs (or resources) to achieve results. How much money is used to generate a certain level of sales.

1½ marks each = 3 marks

b. **Deterministic/Mechanistic Systems**: These are predictable systems where, if the inputs are known, as well as the present state of the system, then thesystem's outputs can be accurately forecast. Machines and computer programs are examples.
Probabilistic/Stochastic Systems: The output of these systems can only be predicted as a probability rather than a certainty. This is true of almost all social or organizational systems as it is always impossible to account for all inputs.

1 marks each = 2 marks

c. i. A model is an abstraction or an approximation of reality. **2 marks**
ii. 1. Verbal.
2. Physical.
3. Schematic.
4. Mathematical.

1 mark each for any three = 3 marks

d. i. Systems investigation.
The analysis and design cycle begins with a desire to find a better data and information processing system. The particular systems that will undergo analysis and design are determined during systems investigation.
The overall purpose of systems investigation is to determine whether the existing system is satisfying the goals and objectives of the organization.

ii. Systems analysis.
After a project has been given approval for further study, the next step is to perform a detailed analysis of the existing system. The overall emphasis is to uncover some of the inherent problems and limitations of the existing system and to determine the extent to which the existing system is achieving the organization's goals and objectives.
iii. Systems design.
The emphasis of systems design is to develop a new system that helps to achieve the goals and objectives of the organization and overcomes some of the shortcomings and limitations of the existing system.
iv. Systems implementation

In this phase, the system or system modifications are installed and made operational in a production environment. The phase is initiated after the system has been tested and accepted by the user. Activities in this phase include notification of implementation to end users, execution of the previously defined training plan, data entry or conversion, completion of security certification and accreditation and post implementation evaluation. This phase continues until the system is operating in production in accordance with the defined user requirements.

2 marks each for any four = 8 marks

e. i. A degree or higher in engineering, computer science, or technical field related to the project.
ii. Demonstrated ability to manage development projects, to include accountability for project cost, schedule, and technical performance.
iii. Knowledge of agency development policies and procedures.
iv. Demonstrated ability to manage contracted efforts.
v. Demonstrated ability to represent the project at all levels of the government as well as to the public.

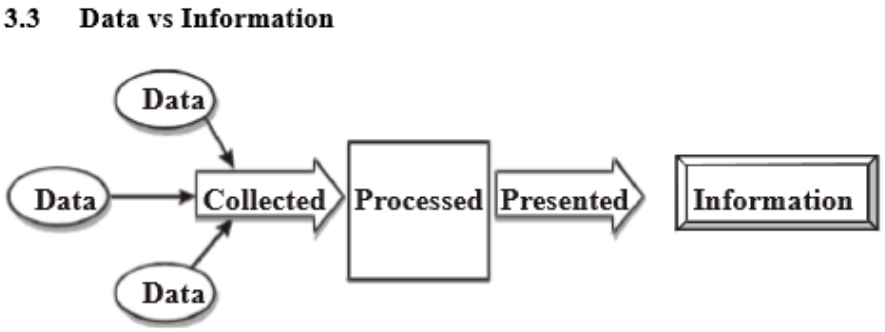
1 mark each for any four = 4 marks

2a. **Closed Systems**: A system that is cut off from its environment and does not interact with it. These systems have no exchange with the environment, i.e. all interaction goes on within the system's own boundaries. This term normally applies to machinery where, if inputs are known, then outputs can be accurately predicted. Systems within organizations cannot be described in this way - interaction with other systems is an inherent characteristic of organizational systems. A closed community would be an example of a (social) closed system.

Open Systems: A system that interacts freely with its environment. It receives inputs from its environment, processes or transforms these inputs and passes outputs of various types back into its environment. In this type of system, only some of the relevant inputs can be identified, others may occur unexpectedly, for example, a company's competitor may unexpectedly lower prices etc.

4 marks

b.



a will enable an individual to gain knowledge in order to be able to make a decision.

4 marks

c. i.**Relevance/Appropriateness**: Information must be relevant to the problem being considered. Too often reports etc, contain irrelevant parts which make understanding more difficult and cause frustration to the user and lead to information overload.

ii. **Accuracy**: Information should be sufficiently accurate for the purpose for which it is intended, Need for accuracy varies according to information usage e.g. marketing director only interested in sales figures to +/- N15,000? • Completeness: The information should be complete in respect of the key elements of the problem.

iii. **Timeliness**: Good information is that which is communicated in time to be used.

iv. **Reliable**: Users must have confidence in the source of the information for it to be used.

v. **Communicated to the right person**: Information suppliers need to analyze the key decision points in an organization in order to direct information exactly where it is required.

vi. **That which contains the right level of detail**: Information should contain the least amount of detail consistent with effective decision-making. The level of detail should vary with the level in the organization; the higher the level the greater the degree of compression and summarization.

vii. **Communicated by an appropriate channel of communication**. To be useable by the manager, information must be transmitted by means of a communication process.

viii. Communication involves the interchange of facts, thoughts, value judgements and opinions and the communication process maytake many forms: face-to-face conversations, telephone calls, informal and formal meetings, reports, tabulations, VDU transmissions etc. Whatever the process, good communication results where the sender and receiver are in accord over the meaning of a particular message.

ix. **That which is understandable by the user. Understandability** is what transforms data into information. If the information is not understood, it cannot be used and thus cannot add value.

1 mark each for any four = 4 marks

3a. i. Marketing Information System
ii. Manufacturing Information System
iii. Distribution
iv. Accounting and Finance
v. Personnel
vi. Administration

1 mark each for any four = 4 marks

b. Examples of areas in which systems thinking has proven its value include:

i. Complex problems that involve helping many actors see the “big picture” and not just their part of it

ii. Recurring problems or those that have been made worse by past attempts to fix them

iii. Issues where an action affects (or is affected by) the environment surrounding the issue, either the natural environment or the competitive environment

iv. Problems whose solutions are not obvious

1 mark each for any three = 3 marks

c. **The Monopolist Approach**

The monopolist approach is used by firms who wish to keep a tight control over end-user computing. The Information System (IS) organization is given complete control of all computing resources, including both mainframe and micro computers. End-user computing is only allowed to grow at a very slow, controlled rate that is regulated by policies of the IS organization. For example, the acquisition of each personal computer is thoroughly researched to determine if it is really necessary and all applications must be approved and developed by the IS department. Firms that believe that the IS organization should have control of all information processing systems will adopt this approach.

The Laissez-Faire Approach

The laissez-faire approach is almost the exact opposite of the monopolist approach. In this system, departments within the organization are each given their own budgets for end-user computing needs. It is felt that each department will make better use of this money in acquiring systems tailored to their needs than by letting a central organization do it for them. IS managers have no say in the growth of end-user computing. While this approach allows for extreme creativity and perhaps greater short term user satisfaction it also has some major drawbacks.

The Information Center Approach

The Information Center (1C), which has been implemented by many firms and is known by many names in different organizations, is in the best position to deal with the problems concerning end-user computing. Those firms who have used the 1C to its potential have achieved good results. The main duty for information centers has been to purchase hardware and software that meets the needs of the end user while maintaining standards that ensure compatibility and a good use of resources. They determine what products will be used, where they will be bought, and how they will be maintained.

2½ mark each for any two = 5 marks

4a. Capability
Control
Communication
Cost
Competitiveness

1 mark each for any three = 3 marks

b. **Requests from Department Managers**

Frequently, departmentmanagers who deal with day-to-day business activities are looking for assistance within their departments.

Requests from Senior Executives

Senior executives like presidents, vice-presidents usually have more information about the organization as compared to departmental managers. Since these executives manage the entire organization, so naturally they have broader responsibilities.

Requests from System Analysts

Sometimes systems analysts find areas where it is possible to develop projects. In such cases, they may prefer either writing systems proposal themselves or encouraging a manager to allow the writing of a proposal on their behalf.

Requests from Outside Group

Developments outside the organization also lead to project requests. For example, government contractors are required to use special cost accounting systems with government stipulated features.

1 mark each for any three = 3 marks

c. i. **Define The Problem** - Clearly define and document the problem. If possible, it should be described from a management perspective.

ii. **Review the Current Work Process Documentation** - If no Documentation exists, it must be developed. If it is not clear and up- to-date, it should be updated to clearly describe the current work process. The information processing requirements must be part of the documentation for the current work process or the current IT system.

iii. **Evaluate the Work Process** - There are two questions to address in the work process evaluation: Should We Be Doing This? And can the Process Be Improved?

iv. **Define the New Processing Requirements** - Define the information processing requirements for the proposed work process at a general level. The security requirements should be addressed in terms of data integrity, reliable processing, privacy and confidentiality.

v. **Determine Its Performance Measures** - Identify indicators for measuring and assessing performance of the process and the IT system in relation to the mission of the organization. Also, determine the means of collecting and storing the performance data.

1½ mark each for any four = 6 marks

5a. **Conversion Plan**

The Conversion Plan describes the strategies involved in converting data from an existing system to another hardware or software environment. It is appropriate to re-examine the original system's functional requirements for the condition of the system before conversion to determine if the original requirements are still valid.

Implementation Plan

The Implementation Plan describes how the information system will be deployed and installed into an operational system. The plan contains an overview of the system, a brief description of the major tasks involved in the implementation, the overall resources needed to support the implementation effort (such as hardware, software, facilities, materials, and personnel), and any site-specific implementation requirements. **4 marks**

b. In developing application software, a general chart to reveal the overall purpose and structure of the application is needed. This is usually called the **system flowchart** or **application flowchart**. Flowcharts that are more detailed are also needed that reveal how each program is to be developed. This type of flowchart is called a **program flowchart**. **4 marks**

c. Decision tables reveal what decisions or actions the computer is to take as a result of the input data. When the computer has to make a large number of decisions or if there are a large number of different branches within a program, decision tables are particularly useful. In these cases, decision tables are preferred to flowcharts. **4 marks**

6a. Assembly languages

Computers from different manufacturers have different assemblers and assembly languages. In addition to the conversion of the mnemonic operation code and decimal operand in each instruction into machine code, most assembly languages have functions to facilitate programming, such as combining a sequence of several instructions into one pseudo-instruction. Machine code instructions are then generated from this pseudo-instruction. Programming in assembly languages requires a solid knowledge of computer architecture and is more time-consuming than programming in high-level languages. **3 marks**

b. **Shorter development**

Shorter development. Using RAD, the operational version of an application is available much earlier than with a conventionaldevelopment. Average delivery time-scales are in the range of three - six months.

Business focus. The key emphasis in RAD is fulfilling business need. This is frequentlyexpressed in terms of the 80/20 rule. The assumption is that 80% of an application can be delivered in 20% of the time. The remaining 20% of an application frequently amounts to copper-plating' - putting a technical finish on the software product.

Lower cost. Because RAD produces systems more quickly and to a business focus, this approach tends to produce systems to a lower cost. This is particularly important at a time where business is looking to the IS function to better justify its investment in information technology.

Stakeholder commitment. It is claimed that RAD projects engender a greater level of commitment from stakeholders, both business and technical, than conventional development. Users are seen as gaining more of a sense of 'ownership' of a system. Developers are seen as gaining more satisfaction from producing successful systems quickly.

1 mark each for any three = 3 marks

c. i. **Technical**. Risk associated with creating a new capability or capacity

ii. **Supportability**. Risk associated with implementing, operating, and maintaining a new capability

iii. **Programmatic**. Risk caused by events outsidethe project's control, such as public law changes

iv. **Cost and Schedule**. Risk where cost or schedule estimates are inaccurate or planned efficiencies are not realized.

1 mark each for any three = 3 marks

d. i. Hierarchical Model

ii. Network model

iii. Relational Model

1 mark each for any three = 3 marks