Tabla del número de ítems por resultados de aprendizaje del programa de estudio Prueba Nacional Escrita Comprensiva de Especialidades en Educación Técnica 2024
Convocatoria ordinaria y extraordinaria (aplazados)
COMPUTER SCIENCE IN SOFTWARE DEVELOPMENT 2024

Estimada persona docente:

A continuación, se le suministra el número de ítems que tendrá la Prueba Nacional Escrita Comprensiva Estandarizada de Especialidades en Educación Técnica en la especialidad de Computer Science in Software Development, según la distribución de objetivos adaptados y contenidos del programa de estudio para el periodo lectivo 2024, de acuerdo con la consulta realizada a los profesores en las diferentes regiones educativas del país.

Topic	Measurement objective	Contents	N° ítems

COMPUTER BASIS	1. Identifying concepts, characteristics and elements for developing Information and Communication Technologies (ICT).	- History of computing and computer science
		- Computer Generations
		- Differences between computing and computer science
		- Development of information and communication technologies
		- Concepts
		  - Information, Communication, ICT
		  - Computer science
		  - Computers
		    - Hardware
		    - Software
		      - Of application,Systems
		      - Programming languages
		      - Tutors, Systems authors and experts, Simulators
		- Artificial Intelligence, Robotics,Virtual reality, Telematic,Networks
			2

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Topic	Measurement objective	Contents	N° ítems

APPLICATION SOFTWARE	2. Utilizing functions in operating systems for computer hardware and software administration.	- Disk Operating System
		- Concept
		- Characteristics
		- Utilities
		- Drivers configuration
		- DOS Internal Commands
		  - Concept
		  - Characteristics
		  - Uses
		  - Syntax
		- DOS External Commands
		  - Concept
		  - Characteristics
		  - Uses
		  - Syntax
			2

Topic	Measurement objective	Contents	N° ítems

WEBSITE DESIGN	3. Using applications related to the Internet for searching and accessing information.	- Internet
		   - Concept
		   - Concepts related to the Internet
		   - Domains
		   - Hypertext
		   - Protocols
		   - Address
		- Internet services
		   - Surf or search for information
		   - Electronic mail
		   - Chat
		   - TelNet
		   - File Transfer Protocol (FTP)
		   - Word Wide Web (WWW)
		- TCP/IP
		- Requirements for Internet connection
		   - Connection forms
		   - Suppliers
		   - Access types
		   - Access software
		   - Hardware
			2

Topic	Measurement objective	Contents	N° ítems

SPECIALIZED INFORMATION SYSTEMS	4. Identifying information systems concepts, characteristics and applications.	- Information Systems
		  - Concept
		  - Characteristic
		  - Uses and applications
		  - Contributions to daily work
		- Elements of the Information Systems
		  - Menus, buttons, windows, and others
		  - User-accessible registers
		  - Search options
		  - Basic operations to obtain information
			1

Topic	Measurement objective	Contents	N° ítems

CONNECTIVITY	5. Recognizing characteristics and requirements for the operation of different mobile devices and equipmentconnectivity	- Connectivity
		  - Concept
		  - Characteristics
		  - Uses and applications
		  - Requirements
		  - Compatibility between equipment and devices
		  - Contributions to daily work
		- Connectivity options between equipment or devices
		  - Wire, Wireless, Infrared Port
		  - Microwaves, Wi-Fi, Bluetooth
		  - Others
		- Mobile devices
		  - Computers
		    - Desktop,laptop
		  - Digital cameras
		  - Photography
		  - Video
		  - Cellular telephones
		    - TDMA, GSM
		    - Dual use technology
		    - Others
		    - Personal Digital Assistant
		- Digital pencil
			2

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COMPUTER SCIENCE IN SOFTWARE DEVELOPMENT 2024

Tema	Objetivo de medición	Contenido	N° ítems
HERRAMIENTAS LÓGICAS	6. Distinguir la lógica proposicional y la lógica de predicados en la determinación de la validez de una proposición dada.	- Conectivas básicas de la lógica - Negación - Disyunción - Conjunción - Leyes de De Morgan - Proposiciones condicionales y equivalencias lógicas - Razonamientos y demostraciones - Tablas de verdad - Tautología, contradicciones y contingencias	**1**
	7. Resolver problemas utilizando el álgebra de Boole, sistemas numéricos, álgebra de matrices, relaciones de recurrencia, permutaciones,combinaciones y mapas deKarnaugh.	- Álgebra de Boole - Teoremas y propiedades - Compuertas - Principios de dualidad - Circuitos combinatorios - Sistemas numéricos - Binario, octal, hexadecimal - Representación numérica - Cambio de base - Operaciones básicas - Matrices y álgebra de matrices - Relaciones de recurrencia - Sucesión del Fibonacci - Torres de Hanoi - Función Arkermam	**2**

Tema	Objetivo de Medición	Contenido	N° ítems
HERRAMIENTAS LÓGICAS		- Mapas de Karnaugh	

ALGORITMOS , DIAGRAMAS DE FLUJO, ELEMENTOSDE PROGRAMACIÓN	8. Resolver problemas computacionales utilizando algoritmos y los elementos que interviene en el desarrollo de un programa como herramienta para la resolución lógica de los mismos en pseudocódigo.	- Análisis y verificación de algoritmos
		- Estructuras lógicas
		   - Condiciones y ciclos
		- Bloques de decisión
		   - Usos y aplicaciones
		- Condiciones
		   - Usos y aplicaciones
		- Expresiones Booleanas
		   - Usos y aplicaciones
		 - Estructura para la declaración
		   - Decisiones múltiples y anidadas
		- Estructuras repetitivas
		   - Usos y aplicaciones
		- Contadores y acumuladores
		   - Aplicaciones
		- Ciclos
		   - Usos y aplicaciones
		- Ciclos anidados
		   - Usos y aplicaciones
			4

Topic	Measurement objective	Contents	N° ítems

OCCUPATIONAL HEALTH	9. Describing the main concepts and specific aspects of Occupational Health.	- Meanings of the words
		  - Work
		  - Health
		  - Occupational Health
		  - Risk at work
		  - Accidents
		  - Occupational disease
		  - Professional disease
		  - Igneology
		  - Fire
		  - Ignition
		  - Flames
		  - Fumes
		  - Flammable
		  - Workload
		  - Fatigue, stress
		  - Physical load
		- Wastes
		  - Types
		  - Originating from computers
		  - Elimination and management
		- Garbage
		  - Types
		  - Classifications
		-
			2

Topic	Measurement objective	Contents	N° ítems
OCCUPATIONAL HEALTH		- Types of agents - Physical - Chemical - Biological - Ergonomic - Normalization of colors - Colors used red, orange, blue, violet, white, black and gray - Symbols and danger signs - Demarcation of machines, risk areas and safety roads	
COMPUTER ARCHITECTURE	10.Describing the internal components of a computer.	- Basic (hardware) components - BIOS - Memory - Types - Characteristics - Speeds - Processor - History - Types or families - Technical characteristics - Mathematical coprocessor - Cache - Heatsink	**3**

COMPUTER SCIENCE IN SOFTWARE DEVELOPMENT 2024

Topic	Measurement objective	Contents	N° ítems

COMPUTER ARCHITECTURE		- Motherboard
		   - Types
		   - Technical characteristics
		   - Parts
		- Grooves or sockets
		- Multimedia
		- Video
		   - Cards
		   - Types
		   - Characteristic
		   - Memory
		   - Monitors
		      - Resolution
		      - Sizes
		      - Cards for video capture
		- Adapters of I/O and ports
		   - Concepts
		   - Characteristics
		   - Types
		      - Series
		      - Parallel
		      - Wireless
		      - USB	

Topic	Measurement objective	Contents	N° ítems
COMPUTER ARCHITECTURE		- Net interface cards - Concepts - Characteristics - MAC address - Other components - Buses - Switches and jumpers - Cables, bands and strips - Wireless devices - Portable devices - Encluster - Units of massive storage - Mobile phone	
MAINTENANCE & UPGRADING COMPUTER	11.Determining general computer network concepts.	- Principles of networks - Definition - Benefits - Types of nets - LAN - WAN - WLAN - Peer to peer - Client / server - Basic concepts of nets and technologies - Band width and transmission of data - Addressing IP	**2**

Topic	Measurement objective	Contents	N° ítems
MAINTENANCE & UPGRADING COMPUTER		- DHCP - Internet protocols and applications - ICMP - Physical components of a network - Characteristic of network cables	

PROGRAMMING	12. Solving simple programs through selecting structures, operators, repetitive structuresand functions in pseudocode.	- Selection structures
		  - If
		  - If / else
		  - While
		- Repetitive structures
		  - For
		  - Do / while
		- Functions
		  - Definition
		  - Calling
		  - Per value
		  - Per reference
			3

Topic	Measurement objective	Contents	N° ítems

DATA STRUCTURES	13.Identifying the concepts, characteristics, uses and applications of different data structures.	- Data use
		  - Information sources
		  - Types of decisions
		  - Data and decisions
		  - Data management
		- Data structures
		  - Concept
		  - Characteristics
		- Classification
		  - Static
		  - Dynamic
		  - Memory
		    - Static
		    - Dynamic
		- Arrays
		  - Concept
		  - Types
		    - One dimensional
		    - Multi-dimensional
		  - Declaration
		  - Methods of storage
		  - Syntax
		  - Operation
		  - Moving from arrays to functions
		  - Processing
			2

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Topic	Measurement objective	Contents	N° ítems

DATA STRUCTURES		- Search in arrays
		- Pointers
		    - Declaration
		    - Initialization of pointer variables
		    - Pointer operators
		    - Summoning functions by reference
		    - Qualifier
		    - Processing
		- Records
		    - Record formations
		    - Identification passwords
		    - Record declaration
		    - Record arrays
		    - Record operations
		    -
		- Linked lists
		    - Concept
		    - Representation
		        - Sequential
		        - Non- sequential
		    - Types of lists
		        - Simple
		        - Circular
		        - Double linked	

Topic	Measurement objective	Contents	N° ítems
DATA STRUCTURES		- Basic operations - Management of available space	

IMPLEMENTATION OF DATA STRUCTURES	14. Utilizing conceptual and theoretical principles for the stacks, lines handling, graph and trees as strategies for specific problem solving.	- Stacks
		  - Operations on stacks
		  - Stacks declaration
		  - Applications
		  - Storage methods
		- Queues
		  - Queues theory
		  - Operations
		  - Behavior
		
		- Graphs
		  - Paths Trajectories
		  - Cycles
		  - Directed graphs programs
		    - Trajectories
		    - Searches
		    - Critical paths
		- Trees
		  - Types
		    - General
		    - Binary
		    - Binary search
		    - Linked binaries
			2

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Topic	Measurement objective	Contents	N° ítems

IMPLEMENTATION OF DATA STRUCTURES		- Representation
		     - Definition
		     - Searches
		        - Sequential
		        - Directs
		     - Operations
		        - Insertion
		        - Suppression	

INTRODUCTION TO OBJECT ORIENTED PROGRAMMING	15.Distinguishing object oriented programming concepts, characteristics and applications.	- Programming and abstraction
		    - Abstraction
		    - Procedures, modules, objects
		    - Types of abstract data
		    - Programming
		    - Structured programming vs OOP
		 - Orientation to objects
		    - Abstraction
		    - Encapsulation
		    - Modularity
		    - Hierarchy
		    - Polymorphism
		    -
			2

Topic	Measurement objective	Contents	N° ítems

INTRODUCTION TO OBJECT ORIENTED PROGRAMMING		- Modularity
		    - Concept
		    - Characteristics
		    - Modules
		        - Design
		        - Structure
		    - Modularity Rules
		    - Types of data
		    - Implementation of abstract types of data
		- OOP
		    - Objects
		        - Concept
		        - Characteristics
		        - Objects before classes
		        - Methods and messages
		        - Classes
		- Communication among objects
		    - Internal structure of an object
		    - Inheritance
		    - Overload	

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Topic	Measurement objective	Contents	N° ítems

OBJECT ORIENTED PROGRAMMING	16.Utilizing principles and fundamentals of object oriented programming as tools for specific problem solving.	- Object Oriented Programming
		   - Classes
		   - References to objects
		   - Instance variables
		   - Operators
		   - Methods
		      - Declaration
		      - Invocation
		   - Regarding writing
		   - Overload
		   - Constructors
		   - Destroyers
		- Data structure management
		   - Creation, initialization
		   - Operations with data structures
		   - Searches and processing in different data structures
		- Memory management
		- Inheritance
		   - Base Class
		   - Extending classes
		   - Relation among classes
		   - Constructors and destroyers
			2

Topic	Measurement objective	Contents	N° ítems

OBJECT ORIENTED PROGRAMMING		- Polymorphism
		   - Relations among objects
		   - Types and structures fields
		- Abstract classes constructors destroyers	

QUALITY CULTURE	17.Recognizing the basic principles of quality, as well as the contribution of team work in achieving the target goals and daily tasks of a computer system technician.	- Quality
		   - Concepts
		   - Characteristics
		   - Quality in different fields
		     - Personal
		     - Family
		     - Community
		     - Professional
		- Quality control
		- Tools for continuous improvement
		   - Brainstorming
		   - Flow diagram
		   - Cause-effect diagram
		   - Pareto chart
		- Teamwork
		   - Concepts
		   - Characteristics
		   - Importance
		   - Attitudes and personal values
		   - Elements that influence teamwork
			1

Topic	Measurement objective	Contents	N° ítems

QUALITY CULTURE		- Group
		    - Concepts
		    - Characteristics
		- Difference between groups and teams
		- Negotiation
		    - Concept
		    - Characteristics
		    - Principles
		- Attitudes and personal values necessary for negotiation	

MANAGEMENT OF COMPUTER PROJECTS	18.Identifying basic elements in the project management.	- Computer Projects
		    - Concepts
		    - Features
		    - Mistakes made in programming a computer project
		    - Risk management
		- Project Life Cycle
		    - Concepts
		    - Features
		- Types of project design
		    - Waterfall
		    - Prototyping
		    - Delivery in stages,Evolutionary Delivery
		    - Other,Selection of the project's life cycle
			1

Tema	Objetivo de medición	Contenido	N° ítems

PRINCIPIOS DE DISEÑO	19.Identificar los conceptos y elementos fundamentales del diseño.	- Elementos del diseño
		  - Punto
		  - Línea
		  - Color
		  - Contraste
		  - Textura
		  - Proporción
		  - Ritmo
		  - Movimiento
		  - Equilibrio
		- Composición artística
		- Técnicas de presentación
		- Principios del diseño tridimensional
			2

TEORÍA DEL COLOR	20.Identificar los conceptos y elementos fundamentales relacionados con la teoría del color.	- El matiz, el valor y la intensidad
		- Elementos básicos para percibir el color
		- El espectro visible de la luz
		- El ojo y sus partes
		- Mezclas del color
		  - Aditiva (RGB)
		  - Sustractiva (CMY)
		- El círculo cromático
			2

Tema	Objetivo de medición	Contenido	N° ítems

TEORÍA DEL COLOR		- Colores
		  - Primarios
		  - Secundarios
		  - Complementarios
		  - Cálidos
		  - Fríos
		- Combinaciones de colores
		- Principios de psicología del color	

DISEÑO TIPOGRÁFICO Y COMPOSICIÓN ARTÍSTICA	21.Identificar los conceptos y elementos fundamentales relacionados con la tipografía.	- Tipografía
		  - La escritura
		  - Concepto
		  - Elementos fundamentales
		  - Diseño tipográfico
		  - Familias tipográficas
		  - Carteles, afiches y posters
		- Diseño tipográfico
		  - Tipos de letras
		  - Tamaños
		  - Efectos de fuente
		- Relación entre el elemento gráfico y el diseño tipográfico
			2

	22.Identificar los conceptos y técnicas fundamentales de la percepción y distribución espacial.	- Composición artística
		  - Concepto
		  - Características
		  - Funciones y aplicaciones
		  - Espacio
		    - Real
		    - Geométrico
			2

Tema	Objetivo de medición	Contenido	N° ítems

DISEÑO TIPOGRÁFICO Y COMPOSICIÓN ARTÍSTICA		- Campo de fuerzas interdependientes
		   - Equilibrio
		   - Peso
		   - Composiciones
		     - Dinámica
		     - Estática
		- Elementos de tensión
		- Expresión	

DISEÑO DIGITAL	23. Reconocer los tipos de imágenes y ajustes de color que se pueden trabajar en el diseño gráfico con el apoyo de un software específico.	- Tipos de gráficos
		   - Mapas de bits
		   - Gráficos vectoriales
		- Resoluciones de
		   - Imagen
		   - Monitor
		   - Impresora
		- Sistemas de entrada
		- Scanner
		   - Cámaras digitales
		   - Cámaras de video
		   - Otros
		- Sistemas de salida
		   - Impresoras
		   - Diapositivas
		   - Otros
		Optimización de imágenes
			2

Tema	Objetivo de medición	Contenido	N° ítems

DISEÑO DIGITAL		- Ajuste del color
		  - Fotografías
		  - Histograma
		  - Niveles automáticos
		  - Contraste automático
		  - Niveles
		  - Curvas
		  - Equilibrio del color
		  - Brillo y contraste
		  - Tono y saturación
		  - Desaturar	

	24.Utilizar las herramientas y funciones para el manejo de capas, canales, máscaras y filtros en un software específico	- Capas
		  - Uso
		  - Visualización
		  - Creación y eliminación
		  - Duplicar y eliminar
		  - Opciones de capa
		  - Máscaras de capa
		  - Mover las capas
		  - Tipos de capas
		- Canales
		  - Opciones de canal
		  - Visualización
		  - Trabajar en canal
		  - Duplicación de canales
			2

Tema	Objetivo de medición	Contenido	N° ítems

DISEÑO DIGITAL		- Mezcla de canales
		- Combinar colores
		- Máscaras
		    - Uso de máscaras
		    - Máscara rápida
		    - Aplicación de máscaras
		- Filtros de
		    - enfoque y desenfoque
		    - aspecto artístico
		    - bosquejo
		    - texturizar
		    - trazos de pincel
		    - distorsión
		    - estilización
		    - pixelización
		    - interpretación	

FOTOGRAFÍA DIGITAL	25.Distinguir los componentes y funcionamiento de la cámara fotográfica digital.	- Cámara digital
		    - Concepto
		    - Características
		    - Tipos
		- Funcionamiento
		- Opciones menús disponibles
			2

Tema	Objetivo de medición	Contenido	N° ítems

FOTOGRAFÍA DIGITAL	26.Utilizar los principios del proceso fotográfico digital en la toma de imágenes.	- Proceso fotográfico digital
		  - Concepto
		  - Características
		  - Etapas
		- Consideraciones y principios
		  - Iluminación
		  - Brillo
		  - Contraste
		  - Luz
		  - Sombra
		- Efectos especiales
		- Toma de fotografías
		- Importación de las fotografías
		  - Software
		  - Hardware
			2

Tema	Objetivo de medición	Contenido	N° ítems

INTERFAZ GRÀFICA DE USUARIO	27. Identificar los conceptos y elementos básicos de laidentidad corporativa.	- Identidad corporativa
		  - Concepto
		  - Características
		  - Importancia
		  - Relación entre la identidad corporativay el desempeño de la organización
		  - Principios para el diseño de la identidad corporativa
		  - Elementos que intervienen
			2

	28. Distinguir las normas y técnicas básicas para la elaboración de la identidad corporativa de un ente determinado.	- Estudio de una organización o institución especifica
		  - Concepto
		  - Características
		  - Tipos de empresas
		  - Estructura orgánica y funcional
		  - Cultura organizacional
		  - Valores de la organización
		
		- Diseño de la identidad corporativa
		  - Características
		  - Componentes
		  - Elementos organizacionales que determinan la identidad corporativa
		  - Técnicas para el diseño de la identidad corporativa
		  - Montaje del proyecto de diseño de la identidad corporativa
			2

Tema	Objetivo de medición	Contenido	N° ítems

INTERFAZ GRÀFICA DE USUARIO	29.Identificar los conceptos, características y elementos que integran la interfaz gráfica de usuario.	- Interfaz gráfica de usuario
		  - Funciones
		  - Características
		- Criterios para el diseño
		  - Usuario
		  - Sensibilidad
		  - Personalización
		  - Dirección
		  - Consistencia
		  - Claridad
		  - Estética
		  - Retroalimentación
		- Ventanas
		  - Concepto
		  - Características
		  - Usos y aplicaciones
		- Tipos de ventanas
		  - Principal o de Aplicación
		  - Desplegable o de aparición súbita
		  - Hija
		  - De respuesta
		  - Marco MDI / hoja MDI
		  - Carpeta con fichas o pestañas
		  - Unidad de trabajo
		- Cohesión de ventanas
		  - Tipos de cohesión
		    - Funcional,Secuencial,Comunicacional,Procedural,Temporal
		    - Lógico,Coincidental
		  - Valoración de los niveles de cohesión
			2

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Topic	Measurement objective	Contents	N° ítems
WEB PROGRAMMING	30. Distinguishing the main elements of WEB programming.	- Key considerations for web design - Design of each one of the elements - Construction of elements oriented to the user - Principles - Quality - Functionality - Relevance - WEB sites - Concept - Characteristics - Goals of the site - Types - Static - Dynamic - Interactive - Structure and architecture - WEB pages - Concepts - Characteristics - Types - Applications for the WEB - Design and implementation - Publication on the WEB - Principles - Stability - Reliability - Security	**2**

Topic	Measurement objective	Contents	N° ítems

.NET PROGRAMMING	31.Distinguishing fundamental elements for .NET programming.	- NET Platform
		  - Architecture
		  - Definition of the platform
		  - Layers
		  - Layers of .NET language
		  - .NET Framework
		- Impact of the .NET on the operating systems
		- Advantages of the .NET infrastructure
		- Coexistence of .NET and COM
		- .NET as a multiplatform of development
		  - Determination of the required platform
		  - .NET platform products
		  - Development of .NET applications using SDK
		- Techniques for development in visual environments
		  - Development fundamentals
		  - Syntax elements
			1

Topic	Measurement objective	Contents	N° ítems

OPERATING SYSTEMS	32. Explaining the administrative method of the processor, the processes and the memory of its operating system.	- Memory management
		  - Concepts
		  - Partitions
		  - Assignment of memory pages
		  - Pagination on demand
		  - Page replacement
		  - Assignment of memory
		  - Virtual memory
		- Processor manager
		  - Process planner
		    - Job status and processes
		    - Control unit processes and queues
		  - Planning policies of processes
		  - Algorithms for process planning
		- Process manager
		  - Mutual unit
		  - Parallel procedure
		  - Typical multiprocessing configurations
		  - Synchronization of processes
		  - Cooperation of processes
		  - Current programming
			1

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Topic	Measurement objective	Contents	N° ítems

OPERATING SYSTEMS	33. Using operating system functions for device and file management.	- Device manager
		  - System devices
		  - Direct access storage media
		  - Direct Access to storage devices
		    - Fixed head DASD
		    - Mobile head DASD
		    - Optical storage on disk
		    - Required access time
		  - Components of the I/O subsystem
		  - Communication between devices
		  - Management of I/O request
		    - Search device strategies
		    - Latency strategies
		- File manager
		  - Functions
		  - Volume configuration
		  - Subdirectories
		    - File identification rule
		  - Organization of files
		    - Record format
		  - Physical storage assignment
		  - Data compression
		  - Access methods
		    - Sequential
		    - Direct
			2

Topic	Measurement objective	Contents	N° ítems
OPERATING SYSTEMS		- Levels in a system of file management	

	34.Distinguishing the characteristics of the main operating systems currently used.	- MS – DOS
		    - History
		    - Design goals
		    - Management of
		        - Memory
		        - Processor
		        - Devices
		        - Files
		        - User interface
		- Windows
		    - History
		    - Design goals
		    - Management of the
		        - memory
		        - processor
		        - devices
		        - files
		        - network
		        - security
		        - User interface
		        -
			2

Topic	Measurement objective	Contents	N° ítems

OPERATING SYSTEMS		- UNIX – Linux
		    - History
		    - Design goals
		    - Management of the
		      - memory
		      - processor
		      - devices
		      - files
		      - network
		      - security	

Topic	Measurement objective	Contents	N° ítems

DATABASES	35.Identifying the basic elements, characteristics of differentmodels of databases and the standardization associated with databases.	- Data
		  - Concepts
		    - Data
		    - Records
		    - File
		    - Field
		  - Sources of data
		  - Types of data
		  - Attributes
		  - Value of the data
		  - Systems for data management
		- Databases
		  - Goals of the systems of databases
		  - Database manager
		- Model entity – relation
		  - Interdependence of the data
		  - Architecture of a SABD
		- Relational model
		- Relations, domains, attributes and tuples
		  - Functional dependence
		  - Keys
		  - Primary
		  - Candidate
		  - Alternate
		  - External
			2

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Topic	Measurement objective	Contents	N° ítems

DATABASES		- Normalization
		   - Applications
		   - The first three forms of normalization	

BUSINESS MANAGEMENT	36. Recognizing the components of the administrative processes at work associated with computers.	- Company
		   - Types of companies
		- Management
		   - Concepts
		   - Characteristics
		   - Functional areas
		      - Production
		      - Marketing
		      - Human Resources
		      - Finances
		   - Financial management
		      - Concept
		      - Procedures
		      - Judicial aspects
		- Management of human resources
		   - Hiring and selection
		   - Motivation
		   - Organizational behavior
		   - Aspects of supervision
		      - Personnel motivation
		      - Positive feedback
		      - Conflicts resolution
			2

Topic	Measurement objective	Contents	N° ítems

BUSINESS MANAGEMENT		- Acknowledging efficiency
		- Quality systems
		  - Concept
		  - Importance of doing things right from the start
		  - Customer needs
		- ISO 9000 norms for the operation of a company	

INFORMATION SYSTEM	37.Distinguishing the stages and phases for composing the analysis and design ofInformation Systems.	- Compilation of data
		  - Concepts
		  - Characteristics
		  - Purposes
		  - Techniques for data compilation
		  - Tools
		- Initial Activities
		  - Preliminary investigation
		  - Feasibility study
		  - Preliminary proposal
		- Determination of requirements
		  - Concepts
		  - Activities
		  - Elements to be considered
		  - Techniques to identify requirements
			1

Topic	Measurement objective	Contents	N° ítems

INFORMATION SYSTEM		- Analysis
		  - Concepts
		  - Characteristics
		  - Principles
		  - Types of analysis
		- Analysis data flows
		  - Concepts
		  - Principles
		  - Hierarchies
		  - Diagrams of data flow
		- Data dictionary
		  - Concepts ,characteristics
		  - Uses and applications
		  - Table of symbols
		- Prototypes
		- Concept ,characteristics ,uses and applications	

Topic	Measurement objective	Contents	N° ítems
ENGLISH FOR COMMUNICATION	38.Identifying information about personal interaction at the company, ways of interacting, meeting people, ethics, personal skills, cultural aspects.	- Personal skills, job skills and qualifications, occupations, personal and professional goals - Problem solving.	1
	39.Identifying, consequences of accidents, safe practices in the workplace, prevention procedures.	- Signs and prevention procedures - Procedures to follow in case of an accident - Safe use of work equipment - Special clothes and their use	2
	40.Distinguishing general and specific ideas from technical texts, manuals and catalogues	- Technical manuals · - Technical catalogues · - Equipment and their components	1
TOTAL DE ÍTEMS			75

ANNEX
GLOSARY

OPERATIONAL DEFINITION OF THE VERBS THAT ARE USED IN THE THEMATIC OBJECTIVES AT TECHNICAL LEVEL

DESCRIBING:

To define basic concepts related to occupational health. To describe basic concepts related to components of the computer. To explain technical characteristics of the computer components. To identify each element and its technical characteristics. To define basic concepts related to the storage devices. To describe technical characteristics of the devices. To differentiate technical approaches for the choosing the devices a computer. To describe concepts related to the adapters of E/S. To identify storage devices and technical characteristics of the adapter of E/S. To use technical approaches for the selection of storage devices. IT recognizes adapters of E/S. To explain the operation of each of the devices. To describe technical characteristics of the modems and the technical characteristics. To describes technical characteristics of adapters and modem. It differentiates types of buses, switches, jumpers, cables and others.

DETERMINING:

To mention concepts related to networks. To numerate the types of networks available in the market. To describe the Internet protocols used in networks. To illustrate physical components used in networks.

DISTINGUISHING:

To define concepts. To differentiate among two or more concepts. To compare features. To explain concepts. To determine characteristics, differences and technical functions. To describe concepts that characterize a specific topic. To categorize. To describe parts forming a concept. To show the technical functioning of the system's components. To explain similarities, advantages, disadvantages and differences among different topics. To explain technical processes. To describe technical procedures. To report differences. To use the knowledge to find solutions to problems.

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EXPLAINING:

To define concepts related to memory management and processor administration by the operating system. To describe the processes of memory assignment, pagination and page replacement. To identify basic concepts related to memory management. To recognize the processes carried out by the operating system for the memory assignment. To describe the planning of processes development. To identify basic concepts related to the processor manager. To recognize processes carried out by the operating system for the assignment of the processor. To define concepts related to process management used by the operating system.

IDENTIFYING:

To define concept. To determine features and technical differences. To describe technical requirements, operations and applications. To recognize uses and applications. To classify categories. To explain processes. To recognize the elements that form a concept. To distinguish components and elements that determines a concept. To enumerate classes or types of components that form a concept.

RECONOGNIZING:

To identify concepts related to a specific topic. To differentiate concepts. To interpret concepts related to a specific topic. To classify thematically. To distinguish differences among concepts related to a specific topic. To define concepts. To differentiate categories. To describe functions or features. To explain differences among two or more concepts. To determine the advantages and disadvantages of a specific topic. To distinguish technical requirements. To interpret concepts. To describe methods of sorting and searching in arrays. To explain technical procedures. To establish the importance of measurement to reach quality. To use the different tools for continuous improvement in specific cases. To identify the characteristics of groups and teams. To describe the characteristics of groups and teams. To explain the circumstances and elements that may influence team work. To exemplify team work process and efficient negotiation. To identify the characteristics of groups and teams. To identify the characteristics of groups and teams. To distinguish the attitudes and personal values required for team work and negotiation. To explain the circumstances and elements that may influence team work.

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SOLVING:
To solve computational problems in the technical field by applying one or more processes. To solve computational problems by choosing the appropriate procedures in order to find the solution that requires going beyond the simple calculation in the specific technical field. To interpret pseudocode to find the solution to specific problems. To use the knowledge to find solutions to problems.

USING:
To defines basic concepts related to the Internet. To differentiates available services on the Internet. To recognize the minimum requirements for the Internet connection. To describe characteristics and functions of direct access media and storage devices. To identify characteristics and functions of direct access media and storage devices. To recognizes different components of the I/O subsystem. To explain the communication process between devices. To describe the file manager's interactions and different elements of file organization. To recognize different elements of file organization. To describe the method for the assignment of physical storage and data compression. To describe the access methods of the operating system.

UTILIZING:
To describe concepts related to a specific topic. To describe elements, features and technical processes. To solve specific problems with theory involved. To identify categories. To determine technical similarities and differences. It describes technical criteria. It mentions concepts related to technical processes. It recognizes components forming a specific topic. It uses the knowledge to find solutions to problems.

DISTINGUIR:
Diferenciar entre dos o más conceptos Identificar conceptos. Comparar características. Explicar conceptos. Determinar características, diferencias y funciones técnicas. Describir conceptos que caracterizan una temática específica. Categorizar. Describir partes que forman un concepto. Señalar el funcionamiento técnico de los componentes que forman un sistema. Diferenciar características y el funcionamiento entre dos más conceptos. Explicar similitudes, ventajas, desventajas y diferencias entre distintas temáticas. Explicar procesos técnicos. Describir procedimientos técnicos. Señalar diferencias. Utilizar el conocimiento adquirido para encontrar la solución de un problema.

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IDENTIFICAR:
Definir conceptos. Determinar características y diferencias técnicas. Describir requerimientos técnicos, funcionamientos y aplicaciones. Reconocer usos y aplicaciones. Clasificar categorías. Explicar procesos. Reconocer elementos que forman un concepto. Distinguir componentes y elementos que determinan un concepto. Enumerar clases o tipos de componentes que forman un concepto.

RECONOCER:
Identificar conceptos relacionados con una temática específica. Diferenciar conceptos. Interpretar conceptos asociados a un tema específico. Clasificar temáticas. Distinguir diferencias entre conceptos relacionados con una temática específica. Definir conceptos. Diferenciar categorías. Describir funciones o características. Explicar diferencias entre dos o más conceptos. Determinar ventajas y desventajas de un tópico específico. Distinguir requerimientos técnicos. Interpretar conceptos. Describir métodos de ordenamiento y búsqueda en arreglos. Reconocer formas de declaración de estructuras de datos. Explicar procedimientos técnicos.

RESOLVER:
Dar solución a problemas de cálculo dentro del campo técnico mediante la aplicación de una o varios procesos. Hallar la solución de un problema, implica decidir el procedimiento apropiado para lograrlo, va más allá del simple cálculo. Interpretar pseudocódigo para hallar la solución a problemas específicos. Utilizar el conocimiento adquirido para encontrar la solución de un problema.

UTILIZAR:
Describir conceptos relacionados con un tópico específico. Describir elementos, características y procesos técnicos. Resolver problemas específicos mediante la teoría involucrada. Identificar categorías. Determinar similitudes y diferencias técnicas. Describir criterios técnicos. Citar conceptos relacionados con procesos técnicos. Reconocer componentes que forman un tópico específico. Utilizar el conocimiento adquirido para encontrar la solución de un problema.