

IIoT Course Test Pattern

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1. About Test Structure

Type: Multiple Choices with 4 options per question

Mode: Online Test

Duration: 2.5 hours

Marking Scheme: +1 for every correct answer

Negative Marking for General Aptitude test: -1/3 for every wrong answer.

Industrial Internet of Things (IIoT) :

Part 1 - 40 questions 60 minutes general aptitude test.

Part 2 - 60 questions 90 minutes technical aptitude test.

Students completing the part1 test early will able to move to next section after 45 minutes of the start of the test. Maximum time allowed for part1 60 minutes after which the test automatically shifts part2.

2. General Aptitude Test

a. Verbal Aptitude – 30%

- Grammar Concepts
- Antonyms and Synonyms
- Fill in the blanks
- Error Correction
- Reading Comprehension

- Idioms and Phrases
- Statement and Argument
- Verbal Reasoning
- Critical Reasoning
- Jumbled Sentences

b. Quantitative Aptitude – 35%

- Number System
- Speed and Distance
- Ratio Proportion Variation
- Averages Mixtures and Allegation
- Time and Work
- Percentages
- Profit and Loss
- Simple and Compound Interest
- Fractions
- Partnership
- Progression
- Permutation and Combination
- Probability
- Geometry and Mensuration
- Surds and Indices
- LCM and HCF
- Pipes and Cistern
- Height and Distance
- Set Theory

c. Data Interpretation and Logical Reasoning – 35%

i. Data Interpretation

- Venn Diagram
- Bar Graph
- Line Graph
- Pie Charts
- Tabular Data
- Net Diagrams

ii. Logical Reasoning

- Cubes and Dices
- Day Sequence
- Coding and Decoding
- Clocks Calendar and Age
- Puzzles
- Direction and Senses
- Series
- Input and Output
- Cause and Effect
- Statements and Arguments
- Decision Making
- Data Sufficiency
- Analogies
- Symbols and Notations
- Logical Problems
- Logical Deductions
- Syllogism

3 Technical Aptitude Test for Industrial IOT

3.1 Fundamentals of Computing – 50%

1. Foundation of Mathematics

Numbers, Algebra, Logic, Trigonometry, Coordinate Systems, Determinants, Vectors, Matrices, Geometric Matrix Transforms, Calculus: Derivatives and Integration.

2. Fundamentals of Algorithms

Elementary Data Structures, Divide and Conquer, The Greedy Method, Dynamic Programming, Basic Traversal and Search Techniques, Backtracking, Branch and Bound, Algebraic Problems, Lower Bound Theory, NP-Hard and NP-Complete Problems, Approximation Algorithms, Pram Algorithms, Mesh Algorithms, Hypercube Algorithms

3. Advanced Operating Systems

Process, Threads, Signals, Session Management, Deadlocks, Memory Management, Input/ Output, File Systems, Scheduling and Multi-Processing, Security, Operating System Design, Distributed Files Systems and Advanced Files Systems, Operating Systems: UNIX, Linux and Windows.

4. Advanced Computer Organization and Architecture

Computer Systems Organization, Digital Logic, Micro-Architecture, Instruction Set Architecture, Operating System Machine, The Assembly Language, Parallel Computer Architecture, Organization of a computer, CPU, Multiprocessors, Pipeline, Memory Hierarchy, Storage.

5. Advanced Computer Networks

Concept of layering. LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms (distance vector, link state). TCP/UDP and sockets, congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi-Fi. Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.

6. Distributed Systems

Hardware Concepts, Software Concepts, the Client-Server Model. Remote Procedure Call, Remote Object Invocation, Message Oriented Communication, Stream-Oriented Communication, Processes, Synchronization, Consistency and Replication, Fault Tolerance, Distributed Object-Based Systems, Distributed File Systems

7. Cloud Computing

Distributed Systems modeling, Computer Clusters, Virtual Machines and virtualization of Clusters, Cloud Platform Architecture, Service Oriented Architectures, Cloud Programming and Software Environments, Cloud Resource Management and Scheduling, Storage Systems, Ubiquitous Clouds.

3.2 Fundamentals of Internet of Things (IoT) – 50%

1. Introduction to IoT

History of IoT, Objects/Things in the IoT, The identifier in the IoT, Enabling technologies in IoT: Identification Technology, Sensing and Actuating technology, Smart Technologies, Process Automation and Robotics, Nanotechnology, Connected Objects Communication, Internet in IoT.

2. IoT Architecture and Python

IoT Architecture: State of the art introduction, state of the art; Architecture reference model: Introduction, reference model and architecture, IoT reference model. Logical design using Python: Installing Python, Python data types and data structures, control flow, functions, modules, packages, file handling. Raspberry Pi interfaces (Serial, SPI, I2C), programming Raspberry PI with Python.

3. Industry 4.0

Industrial Internet, Use-cases, IIoT Reference Architecture, Designing Industrial Internet Systems, Access Network Technology and Protocols, Middleware Transport Protocols, Middleware Software Patterns, Software Design Concepts, Middleware Industrial IoT Platforms, IIoT WAN Technologies and Protocols, Securing the Industrial Internet, Smart Factories.

4. IoT in Manufacturing

Robotic Process Automation, Unmanned Aerial Vehicle System, Autonomous vehicle system, Self-Driving Cars, Automated fault detection systems, Automated Material Handling Systems, Automated Packaging, Multi-plant Multi-machine Integration, 5G, Basics of AI and ML.

5. IoT in Automation

IEEE 802.15.4, Powerline Communication, BACnet Protocol, LonWorks Control Networking Platform, ModBus, KNX, ZigBee, Z-Wave, M-Bus, Wireless M-Bus, LTE, ANSI C12 Suite, DLMS/ COSEM, 6LoWPAN, RPL, ETSI M2M Architecture. Fundamentals of Neural Networks and Deep Learning.

6. Envisioned Applications and Challenges

Smart Cities, HealthCare, Smart Homes and Smart Buildings, Mobility and Transportation, Energy, Smart Manufacturing, Smart Agriculture, Environment/ Smart Planet. Interoperability, Openness, Security, Privacy, Trust, Scalability, Failure Handling.

7. IoT Cloud Offerings

Cloud storage models and communication APIs; WAMP: AutoBahn for IoT, Xively cloud for IoT. Hacking wireless lightbulbs to cause sustained blackouts, Abusing Door Locks, Breaching Baby Monitors, Blurred Lines, Attacking Smart Televisions, Connected Car Security Analysis, LittleBits and cloudBits.