NPTEL Online Certification Courses

Indian Institute of Technology Kharagpur

Introduction to Internet of Things

Assignment-Week 1

TYPE OF QUESTION: MCQ/MSQ

Number of questions: **15** **Total marks: 15 X 1= 15**

QUESTION 1:

Which of the following can be used for electrical load balancing?

a. Smart Meter
b. Smart Dust
c. Smart Lock
d. None of them

Correct Answer: a. Smart Meter

Detailed Solution: Smart meters are used in homes or cities. They are used for efficient electrical load balancing, efficient use of electricity, smart pricing, and so on. They can be programmable as well.
See lecture 1 @ 24:20

QUESTION 2:

Which of the following is a function of Smart Dust?

a. To detect or measure chemicals in the soil
b. To diagnose issues in the human body
c. To detect vibration
d. All of these

Correct Answer: d. All of these

Detailed Solution: Smart Dust refers to nano-sized sensors smaller than a grain of sand that can be sprayed or injected for several applications. The applications include measuring chemicals in the soil, diagnosing problems in the human body, as well as detecting light/temperature/vibration.
See lecture 1 @ 27:12

QUESTION 3:

Which of the following term was introduced by Telecommunication service providers?

a. WoT
b. CPS
c. IoT
d. M2M

Correct Answer: d. M2M

Detailed Solution: Machine-to-Machine Communication (M2M) is a term introduced by Telecommunication service providers.
See lecture 1 @ 33:40

QUESTION 4:

Which of the following is true?

a. M2M is not a subset of IoT
b. IoT is a subset of CPS
c. M2M is a subset of IoT
d. IoT and M2M are same

Correct Answer: c. M2M is a subset of IoT

Detailed Solution: M2M is a part of the IoT, where IoT has a broader scope than M2M. Both are different since M2M uses point-to-point communication.
See lecture 1 @ 33:50

QUESTION 5:

Which of the following is a connection of various network segments, organizationally and geographically wide, connecting to the internet?

a. IoT WAN
b. IoT LAN
c. IoT Node
d. IoT Network

Correct Answer: a. IoT WAN

Detailed Solution: IoT WAN is interconnection of two different IoT LANs, connecting various network segments, wide, connecting to the internet.
See lecture 2 @ 4:10

QUESTION 6:

Which of the following can be used as a position sensor?

a. RFM3200
b. Potentiometer
c. DHT11
d. PS2591

Correct Answer: b. Potentiometer

Detailed Solution: Potentiometer works by varying the position of a sliding contact across a uniform resistance. It is often used as a position sensor.

See lecture 3 (Sensing)

QUESTION 7:

Which statement is NOT TRUE:

a. IoT Gateway forwards packets between LAN and WAN on the IP layer.
b. IoT WAN is geographically wide
c. IoT Node can be connected to the internet through a WAN directly.
d. None of these

Correct Answer: d. None of these

Detailed Solution: All the above statements are true.
See lecture 2 @ 4:55

QUESTION 8:

A hydraulic cylinder converts hydrostatic energy into _____ energy.

a. Hydrodynamic
b. Electrical
c. Mechanical
d. None of these

Correct Answer: c. Mechanical

Detailed Solution: A hydraulic cylinder converts hydrostatic energy into mechanical energy.

See lecture 4 @ 4:35

QUESTION 9:

A _______ actuator converts rotary motion into linear motion.

a. Hydraulic
b. Mechanical
c. Electrical
d. None of these

Correct Answer: b. Mechanical

Detailed Solution: A mechanical actuator converts rotary motion into linear motion. Example: rack and pinion.
See lecture 4 @ 14:07

QUESTION 10:

An air pump is an example of

a. Pneumatic actuator
b. Hydraulic actuator
c. Mechanical actuator
d. Electrical actuator.

Correct Answer: a. Pneumatic actuator

Detailed Solution: Air pump acts as a pneumatic actuator.
See lecture 4 @ 9:35

QUESTION 11:

How many layers are there in service-oriented architecture of IoT?

a. 7
b. 6
c. 5
d. 4

Correct Answer: d. 4

Detailed Solution: There are four layers; sensing, network, service, and interface.
See lecture 5 @ 16:20

QUESTION 12:

Which of the following is short range radio used in IoT?

- b. Bluetooth
- c. WiFi
- d. LoRa
- e. None of them

Correct Answer: a. Bluetooth

Detailed Solution: Bluetooth is a short-range and low-level wireless radio module used in IoT.

QUESTION 13:

What allows the “things” in IoT to interconnect and transmit data over the Internet?

- a. Sensors
- b. Network
- c. Internet connection
- d. Backend services

Correct Answer: b. Network

Detailed Solution: A network is what allows the “things” to interconnect and transmit data. See lecture 5 @ 8:15

QUESTION 14:

Which kind of device is an electro-mechanical relay?

- a. Electrical
- b. Electro-mechanical
- c. Mechanical
- d. Electro-magnetic

Correct Answer: d. Electro-magnetic

Detailed Solution: Electromechanical relays are electro-magnetic devices that convert a magnetic flux generated by the application of a low voltage electrical control signal, either AC or DC, across the relay terminals.

QUESTION 15:

Solenoid valves fall under which category of actuators?

- a. Hydraulic
- b. Pneumatic

c. Both hydraulic & pneumatic
d. Mechanical

Correct Answer: c. Both hydraulic & pneumatic

Detailed Solution: A solenoid valve is an electrically activated valve, typically used to control the flow or direction of air or liquid in fluid power systems. It finds applications in both pneumatic and hydraulic fluid power systems.
See lecture 4 @ 5:40

************END***********

Introduction to Internet of ThingsAssignment- Week 2

TYPE OF QUESTION:MCQ/MSQ

Number ofquestions:**15** **Total marks: 15 X 1= 15**

QUESTION 1:

What of the following is a standard port of MQTT protocol?

a. UDP
b. TCP/IP
c. USART
d. None of these

Correct Answer: b. TCP/IP

Detailed Solution:MQTT uses TCP/IP port 1883.
See lecture 6 @ 2:00

QUESTION 2:

Which of the following is NOT true for MQTT protocol?

a. Publish-subscribe protocol

b. Introduced by Telecommunication service providers in 1999

c. Provide connectivity

d. Standardized by OASIS in 2013

Correct Answer: b. Introduced by Telecommunication service providers in 1999

Detailed Solution:MQTT uses publish/subscribe operation to exchange data between clients and the server. It was introduced by IBM in 1999 and standardized by OASIS in 2013.
See lecture 6 @ 2:08

QUESTION 3:

Which of the following commands is correct for MQTT unsubscribe method?

a. unsubscribe(topic)
b. unsubscribe(topic, callback)
c. on_unsubscribe(client, userdata, mid)
d. All of the above

Correct Answer: d. All of the above

Detailed Solution: All the commands are true for MQTT unsubscribe method.The MQTT unsubscribe method allows us to end a subscription to one or more topics.
See lecture 6 @ 6:30

QUESTION 4:

Can a client subscribe to all the topics available with Broker?

a. Yes
b. No

Correct Answer: a. Yes

Detailed Solution: A client can subscribe to an individual or multiple topics. It can subscribe to all topics by using the hash character (#).
See lecture 6 @ 13:00

QUESTION 5:

“X” is a web transfer protocol based on Request-Response model designed for M2M applications.What is “X”?

a. AMQP
b. CoAP
c. Both (a) and (b)
d. None of the above

Correct Answer: b. CoAP

Detailed Solution: CoAP – Constrained Application Protocol is a web transfer protocol. It is based on request-response model and designed for M2M applications.
See lecture 6 @ 01:20

QUESTION 6:

CoAP is _____ layer protocol.

a. Network
b. Session
c. Transport
d. Presentation

Correct Answer: b. Session

Detailed Solution: CoAP is a session layer protocol, intended for use in resource-constrained nodes in IoT architecture. It is also considered as an application layer protocol.
See lecture 7 @ 1:30

QUESTION 7:

Open standards, security, flexibility, and decentralization are the features of which protocol?

a. XMPP
b. CoAP
c. AMQP
d. MQTT

Correct Answer: a. XMPP

Detailed Solution: The architecture of XMPP is decentralized. It is based on open standards, while supporting security features and flexibility (interoperability).
See lecture 7 @ 13:40

QUESTION 8:

BOSH stands for ______________.

a. Bidirectional-streams Over Synchronous HTTP
b. Bidirectional-state Over Secure HTTP
c. Bidirectional Outputfor Synchronous HTTP
d. Bidirectional Output for Secure HTTP

Correct Answer: a. Bidirectional-streams Over Synchronous HTTP

Detailed Solution: BOSH stands forBidirectional-streams Over Synchronous HTTP. This technology is used for HTTP binding for HTTP.
See lecture 7 @ 16:15 (Reference)

QUESTION 9:

In case of XMPP protocol, binary data must be first encoded to ______ before transmission.

a. base128
b. base32
c. base256
d. base64

Correct Answer: d. base64

Detailed Solution: Any XML character data contained within the XML elements used in XMPP protocol MUST be encoded using base64.
See lecture 7 @ 16:50

QUESTION 10:

XMPP stands for ________.

a. Extensible Messaging and Presence Protocol
b. Extended Messaging and Proxy Protocol
c. Xtensible Messaging and Presence Protocol
d. Xtended Messaging and Proxy Protocol

Correct Answer: a. Extensible Messaging and Presence Protocol

Detailed Solution: It stands for Extensible Messaging and Presence Protocol, which is a text-based protocol, built on Extensible Markup Language (XML).
See lecture 7 @ 11:35

QUESTION 11:

Is the basic unit of AMQP data “frame” same as the link-layer “frame”?

a. Yes

b. No

Correct Answer: b. No

Detailed Solution: The link-layer “frame” is different from the AMQP unit “frame”.In AMQP, frame is a formally defined package of connection data. Frames are always written and readcontiguously - as a single unit - on the connection.
See lecture 8 @ 02:00

QUESTION 12:

The messaging sub-layer in CoAP is responsible for ________________.

a. Communication
b. Reliability
c. Avoiding duplication of messages
d. Both (a) and (c)
e. Both (b) and (c)

Correct Answer: e. Both (b) and (c)

Detailed Solution: In CoAP, the messaging sub-layer is responsible for reliability and avoiding duplication of messages.
See lecture 6 @ 05:00

QUESTION 13:

In which of the following fields, AMQP offers interoperability?

a. Devices
b. Protocols
c. Algorithms
d. All of these

Correct Answer: d. All of these

Detailed Solution: AMQP enables interoperability between a wide range of different applications, systems, protocols, algorithms, and messages.
See lecture 8 @ 05:15

QUESTION 14:

In AMQP, the frame type “dispositon” is used to ______________.

a. Inform the changes in state of transfer
b. Control message flow rate
c. Dispose actual messages
d. Dispose new link

Correct Answer: a. Inform the changes in state of transfer

Detailed Solution: The “disposition” frame type is used to inform the changes in state of transfer.The frame type, “flow”, controls message flow rate.
See lecture 8 @ 07:35

QUESTION 15:

Which one of the following is TRUE for addressing in 6LoWPAN?

a. 16-bit addresses for global unique connectivity
b. 64-bit addresses for PAN specific communication
c. IPv6 multicast is not supported by 802.15.4
d. Both (a) and (b)

Correct Answer: c. IPv6 multicast is not supported by 802.15.4

Detailed Solution: In 6LoWPAN, 16-bit addresses are used for PAN specific communication; 64-bit addresses are used for global unique connectivity; and IPv6 multicast is not supported by 802.15.4.
See lecture 10 @ 05:00

**************END*************

Introduction to Internet of Things Assignment- Week 3

TYPE OF QUESTION:MCQ/MSQ

Number of questions:15 **Total marks: 15 X 1= 15**

QUESTION 1:

Layer "X" incorporates channel hopping and channel blacklisting to increase reliability and security. What is "X"?

a. HART Physical layer
b. HART Data Link layer
c. HART Network layer
d. HART Transport layer

Correct Answer: b. HART Data Link layer

Detailed Solution: HART Data link layer, derived from the IEEE 802.15.4 standard, incorporates channel hopping and channel blacklisting to increase reliability and security.
See lecture 11@ 07:25

QUESTION 2:

The transmission in HART is synchronized using ____ slots.

a. 100 microseconds

b. 100 milliseconds

c. 10 milliseconds

d. 10 microseconds

Correct Answer: c. 10 milliseconds

Detailed Solution: In order to control congestion in HART, transmissions are synchronized using 10 milliseconds slots.
See lecture 11@ 11:50

QUESTION 3:

For control applications, which of the following ISA 100.11A usage classes are defined?

a. Class 0
b. Class 1&2
c. Class 1,2&3

d. Class 4&5

Correct Answer: c. Class 1,2&3

Detailed Solution: Usage classes 1,2&3 are defined for control applications. 1: closed loop regulatory control; 2: closed loop supervisory control; 3: open loop control.
See lecture 13@ 19:20

QUESTION 4:

The deterministic communication in Data Link Layer of HART is achieved by __________

a. Channel hopping
b. Channel blacklisting
c. Super-frames
d. Modulation

Correct Answer: c. Super-frames

Detailed Solution: Collison-free and deterministic communication in HART Data Link Layer achieved by super-frames and TDMA.
See lecture 11@ 6:30

QUESTION 5:

What does ISA stand for in ISA 100.11A?

a. International Society of Automation
b. Industrial Society of Automation
c. International Standards of Automation
d. Industrial Standards of Automation

Correct Answer: a. International Society of Automation

Detailed Solution:ISA100.11A is a wireless networking technology standard developed by the International Society of Automation (ISA).

See lecture 13@ 14:30

QUESTION 6:

“Hop selection” is supported by _____________ in Bluetooth technology.

a. Baseband layer

b. L2CAP

c. Both (a) and (b)

d. None of the above

Answer: a. Baseband layer

Detailed Solution: The baseband layer of Bluetooth protocol stack supports services like error correction, data whitening, hop selection, and security.
See lecture 12@11:15

QUESTION 7:

Which of the following is NOT a scheme for re-establishing the connectivity between dumb nodes with other nodes in a wireless sensor networks?

a. CoRD

b. CaRD

c. CoRAD

d. None of the above

Correct Answer: b. CaRD

Detailed Solution: CoRD and CoRAD are the schemesfor re-establishing the connectivity between dumb nodes with other nodes in a wireless sensor networks.
See lecture 15@ 10:50

QUESTION 8:

Which of the following technology does not use the standard 2.4 GHz ISM band?
a. ZigBee
b. Bluetooth
c. NFC
d. 6LowPAN

Correct Answer: c. NFC

Detailed Solution: NFC utilizes 13.56 MHz frequency of the ISM band.

QUESTION 9:

WirelessHART Network Manager handles ______-based network security.

a. Code
b. Collision
c. Time
d. Access

Correct Answer: a. code

Detailed Solution: WirelessHARTnetwork manager handles code-based network security and prevents unauthorized nodes from joining the network.
See lecture 11@ 13:08

QUESTION 10:

How many power-saving modes are there in Bluetooth technology?

- a. One
- b. Two
- c. Three
- d. Four

Correct Answer: c. Three

Detailed Solution: There are three power-saving modes in Bluetooth technology, namely, sniff, hold, and park.
See lecture 12@ 07:35

QUESTION 11:

Which layer provides protocol multiplexing capability?

- a. Physical layer
- b. Data link layer
- c. Middleware layer
- d. Application layer

Correct Answer: b. Data link layer

Detailed Solution: Logical link control and adaptation protocol (L2CAP) provides protocol multiplexing capability, which resides in the Data Link Layer.
See lecture 12@ 12:20

QUESTION 12:

What does RF4CE stand for in “ZigBee RF4CE”?

- a. Radio Frequency for Consumer Electronics
- b. Radio Frequency 4.0 Consumer Electronics
- c. Radio Frequency for Controlled Environment
- d. Radio Frequency 4.0 Controlled Environment

Correct Answer: a. Radio Frequency for Consumer Electronics

Detailed Solution: ZigBee RF4CE (Radio Frequency for Consumer Electronics) is a subset of ZigBee 3.0, developed to replace the infrared remote controls for consumer electronics (TVs, stereos) with radio-based controls.
See lecture 11@ 16:00

QUESTION 13:

NFC tags found in supermarket products are examples of _________ NFC.

a. Active

b. Passive

c. Both (a) and (b)

d. None of the above

Correct Answer: b. Passive

Detailed Solution: NFC tags found in supermarket products are passive devices. The smartphones are examples of active devices.
See lecture 11@ 16:40

QUESTION 14:

Which of the following utilizes Manchester channel encoding?

a. ZigBee
b. NFC
c. Zwave
d. None of the above

Correct Answer: c. Zwave

Detailed Solution: Zwave utilizes GFSK modulation and Manchester channel encoding.
See lecture 13@ 06:50

QUESTION 15:
What are the constraints on sensor nodes?

a. Dispensable
b. Autonomous
c. Low power consumption
d. All of these

Correct Answer: d. All of these

Detailed Solution: Any sensor node must be of small size, consuming low power, and be dispensable, autonomous, and adaptive to the environment.
See lecture 14@ 15:30

**************END************

Introduction to Internet of ThingsAssignment- Week 4

TYPE OF QUESTION:MCQ/MSQ

Number ofquestions:15 **Total marks: 15 X 1= 15**

QUESTION1:

The main goal of human-centric sensing is

a. to sense data only
b. to restrict the people to access data
c. to collect data and allow people to access data and share knowledge
d. to collect data and restrict people to access data and share knowledge
e. All of the above

Correct Answer: c. to collect data and allow people to access data and share knowledge
Detailed Solution: Planning the trajectory of mobile sensor nodes is included in the case of coverage problem in mobile sensor networks.
See lecture 18 @ 11:15

QUESTION2:

Seamless service and connection management falls under ___________ entity of M2M service platform.

a. M2M Access platform

b. M2M User platform

c. M2M Application platform

d. Both (a) and (c)

Correct Answer: c. M2M Application platform

Detailed Solution: The seamless service and connection management is taken care by the M2M Application platform.
See lecture 20 @ 15:30

QUESTION3:

Which among the following is/arethe constraint(s) for UAV network?

a. Prone to environmental effects
b. Changing topology
c. Frequent link breakages
d. All of the above

Correct Answer: d. All of the above

Detailed Solution: UAV network constraints include frequent link breakages, prone to environmental effects, prone to malfunction, and changing topology or node position.
See lecture 19 @ 09:43

QUESTION4:

The popular Optimal Geographical Density Control algorithm falls under which category of area coverage algorithm?

a. Centralized& Localized
b. Centralized&Distributed
c. Distributed & Localized
d. None of these

Correct Answer: c. Distributed & Localized

Detailed Solution: Zhang & Hou proposed theOptimal Geographical Density Control (OGDC) algorithm which is distributed & localized in nature.
See lecture 17 @ 13:00

QUESTION5:

___________ follows the trail of the target and intercepts the target in guided-type target tracking problem formulation in sensor networks.

a. Beacon node

b. Detecting node

c. Tracker

d. Both (a) and (b)

Correct Answer: c. Tracker

Detailed Solution: In guided-type target tracking problem formulation in sensor networks, the tracker follows the trail of the target to intercept it. It is also referred to as interceptor.
See lecture 16 @ 07:35

QUESTION6:

Which of the following is the challenge in human-centric sensing?

a. Participant selection
b. Privacy of users
c. Energy of devices
d. All of the above

Correct Answer: d. All of the above

Detailed Solution: The challenge in human-centric sensing includes participant selection, privacy of users, and energy of devices.

See lecture 18 @ 12:50

QUESTION7:

Machine-to-Machine (M2M) is designed for ____________.

a. Cross-platform integration
b. Isolated systems using proprietary solutions
c. Both (a) and (b)
d. None of the above

Correct Answer: a. cross platform integration

Detailed Solution: M2M is designed for cross-platform integration, while SCADA is designed for isolated systems using proprietary solutions
See lecture 20@ 05:30

QUESTION8:

In cluster-based tracking algorithms, the “cluster head” is responsible for collecting data of its cluster, and then perform, data fusion. What is the other name for “cluster head”?

a. Anchor
b. Master node
c. Locator
d. None of the above

Correct Answer: b. Master node

Detailed Solution: The element "cluster head" is also referred to as master node or group leader. Anchor and locator are other names for beacon node.

See lecture 16, Source ofSlide No.2 - *Target Tracking for Sensor Networks: A Survey*

QUESTION 9:

Which of the following is NOT true?

a. In stationary wireless sensor networks, the topology maintenance is easy.
b. In stationary wireless sensor networks, node failure do not result in partition of networks
c. The topology cannot be change automatically in a stationary wireless sensor network.
d. None of the above is false

Correct Answer: b. In stationary wireless sensor networks, node failure do not result in partition of networks
Detailed Solution: In stationary wireless sensor networks, node failure may result in partition of networks.
See lecture 18 @ 01:06

QUESTION 10:

Is a star topology-based UAV network self-configuring?

a. Yes

b. No

Correct Answer: b. No

Detailed Solution: A star topology-based UAV network is not self-configuring.

See lecture 19 @ 13:05

QUESTION 11:

In Optimal Geographical Density Control (OGDC) algorithm, the starting node broadcasts a message containing _______.

a. Ideal angle

b. Random direction

c. Both (a) and (b)

d. Ideal direction

Correct Answer: d. Ideal direction

Detailed Solution: In OGDC algorithm, a node volunteers as the starting node. This node broadcasts a message containing randomly selected ideal direction.

See lecture17 @21:57

QUESTION 12:

What does FANET stand for?

a. Flying Ad Hoc Network
b. Free Ad Hoc Network
c. Fully autonomous Ad Hoc Network
d. Fully mobile Ad Hoc Network

Correct Answer: a. Flying Ad Hoc network

Detailed Solution: FANET stands for Flying Ad Hoc Network.

See lecture 19 @ 14:10

QUESTION 13:

The passive infrared sensor in wireless sensor networks is used to __________.

a. Detect the objects
b. Sense motion of the objects
c. Detect emitted infrared energy from objects
d. All of the above

Correct Answer: d. All of the above

Detailed Solution: The passive infrared sensors detect infrared radiation emitted by or reflected from objects, thus detecting them and sensing their motion.

See lecture16 @ 16:09

QUESTION 14:

The k-barrier coverage algorithm ensures that a particular barrier is covered by ________ sensors.

a. at least (k-1) sensors

b. at max. k sensors
c. at max. (k-1) sensors
d. at least k sensors

Correct Answer: d. at least k sensors

Detailed Solution: In wireless sensor networks, k-barrier coverage algorithm requires a barrier to be covered by at least k sensors.

See lecture17 @ 14:00

QUESTION 15:

What does SCADA stand for?

a. Supervisory Control and Data Acquisition
b. Sensor Control and Data Acquisition
c. Sensor Control and Data Assessment
d. Supervisory Control and Data Assessment

Correct Answer: a. Supervisory Control and Data Acquisition

Detailed Solution: SCADA stands for Supervisory Control and Data Acquisition.

See lecture20 @ 04:40

************END***********

Introduction to Internet of Things

Assignment-Week 5

TYPE OF QUESTION: MCQ/MSQ

Number of questions: **15** **Total marks: 15 X 1= 15**

QUESTION 1:

Which of the following is NOT a solution to generate unique addresses for device identification?

a. Uniform Resource Identifier

b. Universal Product Code

c. Electronic Product Code

d. None of the above

Correct Answer: d. None of the above

Detailed Solution: Uniform Resource Identifier, Universal Product Code, and Electronic Product Code are used to generate unique addresses for device identification.

See lecture 21 @ 16:10

QUESTION 2:

RESTful web services are utilized for _________.

a. Syntactic interoperability for device interaction

b. Semantic interoperability for device interaction

c. Both (a) and (b)

d. None of the above

Correct Answer: a. Syntactic interoperability for device interaction

Detailed Solution: Service-oriented computing-based architecture, RESTful web services, open standard protocols (IEEE 802.15.4), and closed protocols (Z-wave) are the popular approaches utilized towards syntactic interoperability for device interaction.

See lecture 21 @ 17:40

QUESTION 3:

Can we write the loop() function above the setup() function in an Arduino sketch?

a. Yes

b. No

Correct Answer: a. Yes

Detailed Solution: Yes, we can place the loop() function above the setup() function. However, the setup() will execute first since execution of the setup() is independent of its placement.

See lecture 21

QUESTION 4:

Which of the following is not an inbuilt function of servo library?

a. Sweep()

b. Knob()

c. Move()

d. None of the above

Correct Answer: c. Move()

Detailed Solution: Knob() and Sweep() are the inbuilt functions.

See lecture 25 @ 11:15

QUESTION 5:

Does 6LoWPAN allow interoperability between IEEE802.15.4-based wireless devices?

a. Yes
b. No

Correct Answer: a. Yes

Detailed Solution: 6LoWPAN allows interoperability between IEEE802.15.4-based wireless devices, as well as other IP-based devices. 6LoWPAN simply uses a bridge to enable communication between other devices.
See the book Introduction to IoT by Sudip Misra, et al.

QUESTION 6:

Which of the following is an open, global, multi-sector standard for efficient, accurate, flexible classification of products and services?

a. eCl@ss
b. UNSPSC
c. EPC
d. Both (b) and (c)

Correct Answer: b. UNSPSC

Detailed Solution: UNSPC stands for United Nations Standard Products and Services Code. It is one of the device classification solutions. eCl@ss is the standard utilized for classification and clear description of cross-industry products. Electronic Product Code (EPC) is used to generate unique addresses for device identification.
See lecture 21 @ 16:30

QUESTION 7:

What is the overflow point for micros() function?

a. 50 days
b. 70 minutes
c. 50 minutes
d. 70 days

Correct Answer: b. 70 minutes

Detailed Solution: The overflow point for micros() is 70 minutes. This indicates that the value returned by micros() will return to 0 after 70 minutes.
See lecture 21

QUESTION 8:

In the Universal Middleware Bridge (UMB) architecture, ___________ converts the physical device into the virtually abstracted one.

a. UMB Core
b. UMB Adaptor
c. UMB Handler
d. UMB Manager

Correct Answer: b. UMB Adaptor

Detailed Solution: The UMB Adaptor converts the physical device into the virtually abstracted one described by Universal Device Template(UDT), which consists of a Global Device ID, Global Function ID, Global Action ID, Global Event ID, and Global Parameters.
See lecture 21 @ 27:17

QUESTION 9:

A collaborative sign (cosign) is represented as, cosign = (A, B, C, D). What is "A"?

a. cosign internal identifier

b. structure

c. Both (a) and (b)

d. None of the above

Correct Answer: c. Both (a) and (b)

Detailed Solution: "A" is cosign internal identifier, also referred to as structure.
See lecture 21 @ 21:05 *[Xiao, Guangyi, et al. "User interoperability with heterogeneous IoT devices through transformation." IEEE Transactions on Industrial Informatics (2014)]*

QUESTION 10:

In the Universal Middleware Bridge (UMB) architecture, UMB Core routes the universal metadata message to ____________.

a. Any other UMB Core
b. Any other UMB Adaptor
c. Both UMB Core and UMB Adaptor
d. None of these

Correct Answer: b. Any other UMB Adaptor

Detailed Solution: The major role of the UMB Core is routing the universal metadata message to the destination or any other UMB Adaptors by the Middleware Routing Table(MRT).
See lecture 21 @ 28:10

QUESTION 11:

What does delayMicroseconds() function return?
a. Signed int
b. Unsigned int
c. Both (a) and (b)
d. None of the above

Correct Answer: b. Unsigned int

Detailed Solution: According to the inbuilt Arduino functions. This function pauses the program for the number of microseconds (unsigned int) specified as parameter.
See lecture 21

QUESTION 12:

What is the microcontroller used in Arduino UNO?

a. ATMEGA328p
b. ATMEGA2560
c. ATMEGA32u4
d. AT91SAM3X8E

Correct Answer: a. ATMEGA328p

Detailed Solution: Arduino Uno is a microcontroller board based on the ATMEGA328p, which is 32KB of flash ROM and 8-bit microcontroller.
See lecture 22 @ 06:15

QUESTION 13:

Which of the following functions exist by default in Arduino IDE?

a. main()
b. loop() and main()
c. setup() and loop()
d. setup() and main()

Correct Answer: c. setup() and loop()

Detailed Solution: By default Arduino IDE consists of 2 functions - setup() and loop().
See lecture 22 @ 10:40

QUESTION 14:

Which of the following in the Universal Middleware Bridge (UMB) architecture sends and receives the events generated by changing the device's status?

a. Event Handler
b. Event Manager
c. Event Dispatcher
d. Event Router

Correct Answer: a. Event Handler

Detailed Solution: The Event Handler (EH) of the UMB Adaptor in the Universal Middleware Bridge (UMB) architecture sends and receives the events generated by changing the device's status.
See lecture 21 @ 28:10

QUESTION 15:

Where are the I/O variables initialized in an Arduino sketch?

a. Loop()
b. Setup()
c. Separate function
d. None of the above

Correct Answer: b. Setup()

Detailed Solution: I/O variables and pin modes are initialized in the setup() function in an Arduino sketch.
See lecture 22 @ 13:57

************END***********

Introduction to
Internet of Things
Assignment-Week 6

TYPE OF QUESTION: MCQ/MSQ

Number of questions: **15** **Total marks: 15 X 1= 15**

QUESTION 1:

Is a tuple mutable in Python?

a. Yes

b. No

Correct Answer: b. No

Detailed Solution: Tuples are immutable (can’t be changed) in python. It is an ordered sequence of items.
See lecture 26 @ 15:25

QUESTION 2:

What does 'b' stand for in the following piece of Python code?

```
import array as arr
x = arr.array('b',[1,2,3,4,5])
x = x[::-1]
print (x)
```

a. signed char

b. unsigned integer

c. signed integer

d. unsigned char

Correct Answer: a. signed char

Detailed Solution: As per basics of Python programming.

QUESTION 3:

Which of the following symbol is used to comment a line in python?

a. $
b. #
c. %

d. //

Correct Answer: b. #

Detailed Solution: As per basics of Python programming.

QUESTION 4:

Which of the following method is used to add elements to an array in python?

a. append()
b. extend()
c. insert(i, a)
d. All of the above [(a), (b), &(c)]
e. Only (a) and (c)

Correct Answer: d. All of the above [(a), (b), &(c)]

Detailed Solution: As per basics of Python programming.

QUESTION 5:

Which of the following is true for "= =" operator in python programming?

a. compares the values of both the operands and checks for value equality
b. checks whether both the operands refer to the same object
c. checks if the value is found in the sequence
d. None of the above

Correct Answer: a. compares the values of both the operands and checks for value equality

Detailed Solution: As per basics of Python programming.

QUESTION 6:

Which of the following is an unordered collection of key-value pairs?

a. Tuple
b. List
c. Dictionary
d. Relational array

Correct Answer: c. Dictionary

Detailed Solution: As per basics of Python programming.
See lecture 26 @ 15:36

QUESTION 7:

Which of the following is used when one needs a block of code syntactically, but wants to skip its execution?

a. Pass
b. Continue
c. Break
d. Skip

Correct Answer: a. Pass

Detailed Solution: As per basics of Python programming. [Pass is a null operation.]

QUESTION 8:

What is the output for the following piece of Python code?

```
import array as arr
x = arr.array('I',[1,2,3,4,5])
x = x[::-1]
print (x)
```

a. array('I', [5, 4, 3, 2, 1])
b. array('I', [5, 4, 3, 2])
c. array('I', [1, 2, 3, 4, 5])
d. array('I', [1, 2, 3, 4])

Correct Answer: a. array('I', [5, 4, 3, 2, 1])

Detailed Solution: As per program output.

QUESTION 9:

Which one of the following is correct for image related operations with on-board Raspberry Pi camera in Python?

a. from PIcamera import PiCamera
b. from picamera import PyCamera
c. from picamera import PiCamera
d. None of these

Correct Answer: c. from picamera import PiCamera

Detailed Solution: As per program output.

QUESTION 10:

Which of the following command is used to convert characters into integer?

a. ord()
b. rant()
c. chartoint()
d. char()

Correct Answer: a. ord()

Detailed Solution: According to Python, ord() takes a Unicode character as input and returns the corresponding integer.

QUESTION 11:

In python programming, an array can hold only a single data type element, while a list can hold any data type element. Is the statement true?

a. Yes

b. No

Correct Answer: a. Yes

Detailed Solution: As per Python basics.

QUESTION 12:

Does Raspberry Pi have internal storage?

a. Yes
b. No

Correct Answer: b. No

Detailed Solution: The Raspberry Pi have no internal storage. It requires an SD-card that is set up to boot the RPi.

QUESTION 13:

Which of the following Raspberry Pi model have an on-board Bluetooth module?

a. Raspberry Pi 3
b. Raspberry Pi 2
c. Raspberry Pi 0
d. Both Raspberry Pi 2 & Raspberry Pi 3

Correct Answer: a. Raspberry Pi 3

Detailed Solution: Raspberry Pi 3 have on-board Bluetooth, which is used for

communication or sending/receiving files.
See lecture 28 @ 05:05

QUESTION 14:

The function time.sleep (arg) takes an argument in _____________.

a. seconds
b. milliseconds
c. microseconds
d. nanoseconds

Correct Answer: a. seconds

Detailed Solution: As per the RPi time module basics.

QUESTION 15:

How many GPIO (General Purpose Input Output Pin) pins are there in Raspberry Pi 0?

a. 30
b. 20
c. 40
d. 33

Correct Answer: c. 40

Detailed Solution: All the Raspberry Pi models have 40 GPIO pins.

************END***********

Introduction to Internet of Things

Assignment-Week 7

TYPE OF QUESTION: MCQ/MSQ

Number of questions: **15** **Total marks: 15 X 1= 15**

QUESTION 1:

The switches in a non-Software Defined Network (SDN) environment do not have a global view of the network.

a. True
b. False

Correct Answer: a. True

Detailed Solution: Switches in non-SDN do not have global view of the network. (Please refer Lecture 33@6:53)

QUESTION 2:

Which of the following methods do switches in non-SDN environment use to forward data?

a. Centralized
b. Distributed
c. Hybrid
d. None of the above

Correct Answer: b. Distributed

use a decentralized method for forwarding the data. (Please refer Lecture 33@6:53)

QUESTION 3:

Which of the following is not a component of a switch?

a. Application
b. Operating System
c. Specialized hardware
d. None of the above

Correct Answer: d. None of the above

Detailed Solution: Since switches in non-SDN do not have global view of the network, they use a decentralized method for forwarding the data. (Please refer Lecture 33@9:13)

QUESTION 4:

Which of the following exist is pairs in a software defined network?

a. Hardware and Operating System
b. Operating System and Application
c. Application and Hardware
d. All of the above

Correct Answer: b. Operating System and Application

Detailed Solution: SDN separates the Operating System and the Application from the hardware. (Please refer Lecture 33@10:05)

QUESTION 5:

Which of the following is not a function of the Application Plane in Software Defined Network architecture?

a. Routing
b. Security
c. Traffic Engineering
d. Forwarding

Correct Answer: d. Forwarding

Detailed Solution: The Data Plane in SDN is responsible for data forwarding. (Please refer Lecture 33@12:25)

QUESTION 6:

How many layers/planes does the SDN architecture consist of?

a. 1
b. 2
c. 3
d. 4

Correct Answer: c. 3

Detailed Solution: The SDN architecture consists of the Application, Operating System, and Data Planes. (Please refer Lecture 33@12:25)

QUESTION 7:

SDN helps in decentralizing the control logic to get an overall view of the network.

a. True
b. False

Correct Answer: b. False

Detailed Solution: SDN helps in creating centralized control logic and maintains an overall view of the network. (Please refer Lecture 33@15:05)

QUESTION 8:

Fill in the blank. Communication between the planes in SDN architecture is done through _______________.

a. Application Programming Interface
b. Integrated development environment
c. Model–view–controller
d. None of the above

Correct Answer: a. Application Programming Interface

Detailed Solution: Communication between the planes in SDN architecture is done through APIs. (Please refer Lecture 33@15:05)

QUESTION 9:

Which of the following is true?

a. Traditional Network: Routing Table, Software Defined Network: Routing Table
b. Traditional Network: Flow Table, Software Defined Network: Routing Table
c. Traditional Network: Routing Table, Software Defined Network: Flow Table
d. Traditional Network: Flow Table, Software Defined Network: Flow Table

Correct Answer: c. Traditional Network: Routing Table, Software Defined Network: Flow Table

Detailed Solution: All switches in traditional network have routing tables and those in Software Defined Network have flow tables (Please refer Lecture 33@17:15)

QUESTION 10:

Fill in the blank:
The operating system Raspbian for Raspberry Pi device is designed as that of __________ processor.

a. 32 bit
b. 64 bit
c. Either 32 bit or 64 bit
d. Neither 32 bit nor 64 bit

Answer: a. 32 bit
Detailed Answer: Raspberry Pi devices may have a 64-bit CPU, but the Raspbian OS (for now) is 32-bit.

QUESTION 11:

Flow rules in a flow table must follow a specific format.

a. True
b. False

Correct Answer: b. True

Detailed Solution: Flow rules in a flow table must follow a specific format. (Please refer Lecture 33@17:15)

QUESTION 12:

Fill in the blanks. When flow rule does not exist in the flow table, the controller sends a ___________ in response to a ____________ message.

a. Flow rule, PACKET-REQ
b. PACKET-ACK, PACKET-IN
c. Flow rule, PACKET-IN
d. PACKET-RREP, PACKET-REQ

Correct Answer: c. Flow rule, PACKET-IN

Flow Rule in response to a PACKET-IN message. (Please refer Lecture 33@23:05)

QUESTION 13:

In actual deployments, the SDN controllers are logically in one-hop distance from the switches.

a. True
b. False

Correct Answer: a. True

Detailed Solution: In actual deployments, the SDN controllers are logically in one-hop distance from the switches. (Please refer Lecture 34@4:31)

QUESTION 14:

In case of lesser number of SDN controllers in a large network, which of the following packets may cause congestion in the network?

a. PACKET-IN
b. Flow Removal
c. Port-Status
d. Error

Correct Answer: a. PACKET-IN

Detailed Solution: As the flow rules keep getting replaced, the network will be congested with PACKET-IN messages in case of lesser number of controllers. (Please refer Lecture 34@5:01)

QUESTION 15:

Which of the architectures exist in SDN controller placement?

a. Flat
b. Ring
c. Tree
d. All of the above

Correct Answer: d. All of the above

Detailed Solution: SDN controller placement supports Flat, Ring, Hierarchical/Tree, and Mesh architectures. (Please refer Lecture 34@5:11)

************END***********

NPTEL Online Certification Courses

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Introduction to
Internet of Things

Assignment-Week 8

TYPE OF QUESTION: MCQ/MSQ

Number of questions: **15** **Total marks: 15 X 1= 15**

QUESTION 1:

In comparison to Software-Defined Networks, traditional networks are cost expensive with respect to which of the following?

a. Both capex and opex
b. Capex but not opex
c. Opex but not capex
d. Neither capex nor opex

Correct Answer: a. Both capex and opex.

Detailed Answer: Traditional networks are cost expensive with respect to both capex and opex in comparison to SDN. (Please refer Lecture 36@2:46)

QUESTION 2:

Which of the following features in Software-Defined Networks is useful for addressing inter-cell interference on base station coordination?

a. Flow tables
b. Logical centralized controllers
c. Path management
d. Network virtualization

Correct Answer: b. Logical centralized controllers.

Detailed Answer: Logical centralized controllers are particularly useful for efficient base station coordination for addressing inter-cell interference. (Please refer Lecture 36@3:38)

QUESTION 3:

eNodeBs' operating under virtualized radio resource management do not get effected by other eNodeBs.

a. True
b. False

Correct Answer: a. True

Detailed Answer: eNodeBs' operating under virtualized radio resource management do not get effected by other eNodeBs. (Please refer Lecture 36@4:48)

QUESTION 4:

Which of the following activities does flow scheduling in UbiFlow perform?

a. Network partitioning
b. Network routing
c. Network scheduling
d. All of the above

Correct Answer: a. Network partitioning

Detailed Answer: A modified OpenFlow is necessary for supporting wireless connections. (Please refer Lecture 36@12:58)

QUESTION 5:

General OpenFlow supports both wireless and wired connections.

a. True
b. False

Correct Answer: b. False

Detailed Answer: A modified OpenFlow is necessary for supporting wireless connections. (Please refer Lecture 36@8:18)

QUESTION 6:

Proactive rule placement in Mobi-Flow depends on which of the following user characteristic?

a. User portfolio
b. User movement
c. User handoff
d. User type

Correct Answer: b. User movement

Detailed Answer: The proactive rule placement depends on the user movement and position in the future course of time. (Please refer Lecture 36@15:18)

QUESTION 7:

The MobiFlow method reduces both energy consumption and message overhead.

a. True
b. False

Correct Answer: a. True

Detailed Answer: The MobiFlow method reduces both energy consumption and message overhead. (Please refer Lecture 36@16:50)

QUESTION 8:

Which of the following should be monitored to detect anomalies in a network?

a. Network traffic
b. Network flow
c. Network state
d. None of these

Correct Answer: b. Network flow

Detailed Answer: Network flow helps in determining superfluous packets in the network. (Please refer Lecture 36@19:10)

QUESTION 9:

Which of the following is true?

a. Cloud characteristic: SaaS, IaaS, hybrid
b. Cloud characteristic: Elasticity, pooling, community
c. Cloud characteristic: Private, public, PaaS
d. Cloud characteristic: Measured services

Correct Answer: d. Cloud characteristic: Measured services

Detailed Answer: Cloud characteristics include broad network access, rapid elasticity, measured services, on-demand self-services, and resource pooling. (Please refer Lecture 36@13:21)

QUESTION 10:

Which of the following refers to sharing of cloud resources and costs across a large pool of users?

a. Agility
b. Ubiquitous
c. Multitenancy
d. Scalable

Correct Answer: c. Multitenancy

Detailed Answer: Multitenancy refers to sharing of cloud resources and costs across a large pool of users. (Please refer Lecture 36@17:51)

QUESTION 11:

Which of the following type of client requires constant communication/connection with the cloud server?

a. Thin client
b. Thick client
c. Both thin and thick clients
d. None of these

Correct Answer: a. Thin client

Detailed Answer: A thin client is a network computer without a hard disk drive and high configurations. They act as simple terminals and require constant communication with the servers. (Please refer Lecture 37@20:00)

QUESTION 12:

Although cloud computing users should feel that they have infinite supply of resources, its utilization should be constantly monitored.

a. True
b. False

Correct Answer: a. True

Detailed Answer: Cloud computing users should feel that they have infinite supply of resources with constant monitoring for billing. (Please refer Lecture 37@22:21)

QUESTION 13:

Fill in the blank: Typically, cloud computing have _____ components?

a. 4
b. 5
c. 6
d. 7

Correct Answer: c. 6

Detailed Answer: Cloud computing has 6 components. They are clients, services, applications, platforms, storage, and infrastructure. (Please refer Lecture 37@23:31)

QUESTION 14:

For a service provider, which of the following service model is best to execute his/her application at the user's end?

a. SaaS
b. PaaS
c. IaaS
d. None of these

Correct Answer: a. SaaS

Detailed Answer: SaaS helps in deploying the service provider's application at the user end. (Please refer Lecture 37@25:41)

QUESTION 15:

In SaaS, users have no control of the cloud infrastructure.

a. True
b. False

Correct Answer: a. True

Detailed Answer: In SaaS, users have no control of the cloud infrastructure. (Please refer Lecture 37@25:41)

************END***********

Introduction to Internet of Things

Assignment-Week 9

TYPE OF QUESTION: MCQ/MSQ

Number of questions: **15** **Total marks: 15 X 1= 15**

QUESTION 1:

Which of the following is true for communications from the sensor nodes to the sink?

a. The communication between them is single hop
b. The communication between them is multi hop
c. The communication between them is both single and multi-hop
d. The communication between them neither single nor multi hop

Correct Answer: c. The communication between them is both single and multi-hop.
Detailed Answer: The communication between them is both single and multi-hop. (Please refer Lecture 42@4:01)

QUESTION 2:

Sink nodes further process data after receiving from the sensor nodes.

- a. True
- b. False

Correct Answer: a. True

Detailed Answer: Sink nodes further process data after receiving from the sensor nodes. (Please refer Lecture 42@4:01)

QUESTION 3:

How many components does a sensor node have?

- a. 1
- b. 2
- c. 3
- d. 4

Correct Answer: c. 3

Detailed Answer: A sensor node has 3 components: Sensing unit, processing unit, and application unit. (Please refer Lecture 42@4:51)

QUESTION 4:

Which category of cloud service does applications like Windows Azure belong to?

a. IaaS
b. PaaS
c. SaaS
d. All of the above

Correct Answer: b. PaaS

Detailed Answer: Windows Azure is a platform for consumers/users to develop and deploy their own applications and hence is categorized as PaaS. (Please refer Lecture 42@7:41)

QUESTION 5:

Which of the following is true for virtual machines?

a. One computer host appears as many computers
b. One computer host appears as some computers
c. One computer host appears as some other computer
d. None of these

Correct Answer: a. One computer host appears as many computers

Detailed Answer: Virtual Machines (VMs) help in abstracting one computer host to appear as many computers. (Please refer Lecture 42@8:25)

In sensor clouds, which of the following actors is analogous to WSN-user in wireless sensor networks?

a. Sensor-owner
b. Sensor cloud service provider
c. End-user
d. All of these

Correct Answer: d. All of these

Detailed Answer: Users in sensor cloud may assume the role of sensor-owner, SCSP, and end-user. They are all different counterparts of WSN-user in Wireless sensor networks. (Please refer Lecture 42@13:15)

QUESTION 7:

In sensor clouds, which of the following sets the price for users as they consume the resources or Se-aaS?

a. End-users
b. Sensor-owner
c. Sensor cloud service provider
d. All of these

Correct Answer: c. Sensor cloud service provider

Detailed Answer: SCSP sets the price for the users for consuming the resources in Se-aaS. (Please refer Lecture 42@14:15)

QUESTION 8:

The SCSP in sensor clouds is responsible for caching the data in the databases.

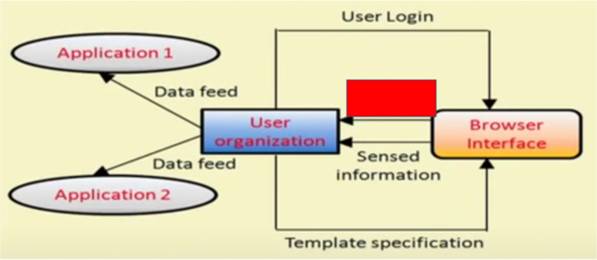
a. True
b. False

Correct Answer: a. True

Detailed Answer: The SCSP in sensor clouds is responsible for caching the data in the databases. (Please refer Lecture 42@14:25)

QUESTION 9:

Select the correct option for replacing the box (in red) in the following architecture for sensor cloud user organization view.



a. User credentials
b. Template display
c. Template view
d. User view

Correct Answer: c. Template view

Detailed Answer: The browser interface sends template view and sensed information to the user organization module in the sensor cloud user organization view. (Please refer Lecture 42@15:16)

In the sensor cloud work flow, which of the following messages does the virtual sensor manager send to the resource manager?

a. Operations request
b. Date aggregation
c. Delete virtual sensor
d. Release resource

Correct Answer: d. Release resource

Detailed Answer: The virtual sensor manager sends a release resource message to the resource manager. (Please refer Lecture 42@16:26)

Which of the following represents an issue while using cloud computing in comparison to fog computing?

a. Latency and velocity
b. Latency but not velocity
c. Velocity but not latency
d. Neither latency nor velocity

Correct Answer: b. Latency but not velocity

Detailed Answer: Cloud computing suffers from latency, volume, and bandwidth in comparison to fog computing (Please refer Lecture 44@9:52)

QUESTION 12:

While handling IoT data, a millisecond can make a huge difference.

a. True
b. False

Correct Answer: a. True

Detailed Answer: While handling IoT data, a millisecond can make a huge difference. (Please refer Lecture 44@14:32)

QUESTION 13:

As an IoT service provider, which of the following external platforms should you choose for deploying your services?

- a. Cloud computing
- b. Fog computing
- c. Cloud and fog computing
- d. Neither cloud nor fog computing

Correct Answer: c. Cloud and fog computing

Detailed Answer: For an end-to-end service, a blend of fog and cloud computing is beneficial for processing and storage. The fog is developed to enhance the services of the cloud and not to replace it.

QUESTION 14:

Consider a network where the data needs to make 5 hops to reach the cloud from the sensors and 1 hop to a fog node. Irrespective of cloud or fog computing, if each hop takes 10ms (inclusive of header reader and writing time), and the data processing time are 2ms (cloud) and 10ms (fog), respectively, what is the percentage improvement in delay on using fog in comparison to cloud? (Take ceil value).

a. 69%
b. 70%
c. 71%
d. 72%

Correct Answer: c. 71%

Detailed Answer:
Total Time (irrespective of fog/cloud) = Time for uploading + Data processing time + Time for downloading.
Total time for cloud = 5x10 + 2 + 5x10 ms = 102ms
Total time for fog = 10 + 10 + 10 ms = 30 ms
Difference = 102 – 30 = 72 ms
Percentage of improvement = (72/102)x100% = ceil(70.58%) = 71%

QUESTION 15:

What of the following is true for fog computing?

a. Fog computing provides transient storage
b. Fog computing provides permanent storage
c. Fog computing provides neither transient nor permanent storage
d. None of these

Correct Answer: a. Fog computing provides transient storage

Detailed Answer: Fog computing provides transient storage. (Please refer Lecture 37@10:00)

************END***********

NPTEL Online Certification Courses

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Introduction to
Internet of Things

Assignment-Week 10

TYPE OF QUESTION: MCQ/MSQ

Number of questions: **15** **Total marks: 15 X 1= 15**

QUESTION 1:

Which part/organ of the human body is analogous to digital communication networks in smart cities?

a. Brain
b. Nerves
c. Cognition
d. Skin

Correct Answer: b. Nerves.

(Please refer Lecture 46@8:55)

QUESTION 2:

Changes in environment and climate have led to the need for smart cities.

a. True
b. False

Correct Answer: a. True

Detailed Answer: Rapidly growing urban population, depleting natural resources and changes in environment and climate has led to the need for smart cities. (Please refer Lecture 46@8:35)

Citizen participation in smart cities falls under which application focus area?

- a. Smart governance
- b. Smart capital
- c. Smart mobility
- d. Smart people

Correct Answer: a. Smart governance

Detailed Answer: Citizen participation in smart cities falls under the smart governance application focus area. (Please refer Lecture 46@10:55)

QUESTION 4:

Fill in the blank. Smart economy in smart cities focuses on ___________.

a. Competitiveness
b. Social and human capital
c. Quality of living
d. Natural resources

Correct Answer: a. Competitiveness

46@11:25)

QUESTION 5:

Which of the following activities should smart home schemes consist of?

a. Self diagnosis
b. Detection of parking spots
c. Remote check-ups and diagnosis
d. Health monitoring

Correct Answer: d. Health monitoring

Detailed Answer: Activities in smart homes involve health monitoring, conservation of resources, and safety and security. (Please refer Lecture 46@19:45)

Which of the following sector of smart cities has self-diagnostics as a part of its activity?

a. Smart health
b. Smart vehicles
c. Smart homes
d. Smart parking lots

Correct Answer: b. Smart vehicles

Detailed Answer: Smart vehicles should have the capability of self-reporting and hence self-diagnostics is important. (Please refer Lecture 46@25:35)

QUESTION 7:

Both traditional and renewable energy sources may be placed in the same smart grid.

a. True
b. False

Correct Answer: a. True

Detailed Answer: Both traditional and renewable energy sources may be placed in the same smart grid. (Please refer Lecture 46@27:45)

QUESTION 8:

Which of the following induces the possibility of data leakage?

a. Side channel
b. Cross-site scripting
c. Muti-tenancy
d. Hardware and software integrations

Correct Answer: c. Multi-tenancy
Detailed Answer: As multi-parties have access to the same set of resources, multi-tenancy has the possibility of increasing data leakages. (Please refer Lecture 46@31:05)

QUESTION 9:

Which of the following does heterogeneity challenge in smart cities consist of?

a. Integrating hardware platforms and specifications
b. Integrating different radio specifications
c. Integrating different software platforms
d. All of these

Correct Answer: d. All of these

Detailed Answer: Heterogeneity challenges consist of integrating hardware platforms and specifications, radio specifications, software platforms, handling user requirements, and others. (Please refer Lecture 46@31:05)

Which of the following is the main challenge in large scale IoT deployments?

a. Delay
b. Distribution
c. Both delay and distribution
d. Neither delay nor distribution

Correct Answer: c. Both delay and distribution

Detailed Answer: Both delay and distributions are challenges in large scale deployments. (Please refer Lecture 46@32:45)

Data cleaning and purification is an important task and does not consume time.

a. True
b. False

Correct Answer: b. False
Detailed Answer: Data cleaning and purification is a time-consuming activity.
(Please refer Lecture 46@33:25)

QUESTION 12:

Which of the following should be acquired for using humans as data sources?

a. Individual consent
b. Informed consent
c. Both individual and informed consent
d. Neither individual nor informed consent

Correct Answer: c. Both individual and informed consent
Detailed Answer: Both individual and informed consent (subject to local or international laws) is necessary for using humans as data sources. (Please refer Lecture 46@33:45)

QUESTION 13:

Which of the following is important for reliable end-to-end IoT implementation?

a. Sensor selection
b. Sensor selection and energy planning
c. Communication medium and network architecture
d. Device placement and network architecture

Correct Answer: d. Device placement and network architecture
Detailed Answer: Device placement and network architecture is important for reliable end-to-end IoT implementation. (Please refer Lecture 46@34:15)

QUESTION 14:
Which of the following is a main challenge in connected vehicles in comparison to that of smart cities?

- a. Device deployment and placement
- b. Mobility
- c. Energy consumption
- d. All of these

Correct Answer: b. Mobility
Detailed Answer: Connected vehicles are highly dynamic in nature in comparison to that of devices in smart cities.

QUESTION 15:

What does X stand for in V2X?

a. IoT
b. Unknown
c. Everything
d. Extra

Correct Answer: c. Everything

Detailed Answer: X in V2X stands for everything.

************END***********

Introduction to Internet of Things

Assignment-Week 11

TYPE OF QUESTION: MCQ/MSQ

Number of questions: **15** **Total marks: 15 X 1= 15**

QUESTION 1:

Which of the following is not true for smart grids?

a. Bidirectional energy flow
b. Bidirectional communication
c. Array of applications
d. None of these

Correct Answer: b. None of these.
Detailed Answer: Smart grids enable bidirectional flow of energy, bidirectional communications, and an array of functionalities and applications. (Please refer Lecture 51@7:14)

QUESTION 2:

Fill in the blank. In comparison to smart grids, the power restoration time in traditional grids after disturbances is _____________.

a. Higher
b. Lower
c. Same
d. None of these

Correct Answer: a. Higher

Detailed Answer: Smart grids help in reducing power restoration time. (Please refer Lecture 51@11:34)

QUESTION 3:

Which of the following is true for running smart devices during peak hours?

a. Lower energy bills
b. Higher energy bills
c. Same energy bills
d. Cannot determine for sure

Correct Answer: b. Higher energy bills

Detailed Answer: Running smart devices during off-peak hours helps in reducing energy bills. (Please refer Lecture 51@14:24)

QUESTION 4:

Who among the following are benefited on using smart grids?

a. Consumers
b. Stakeholders
c. Both consumers and stakeholders
d. Neither consumers nor stakeholders

Correct Answer: c. Both consumers and stakeholders

Detailed Answer: Both consumers and stakeholders are benefited on using smart grids. (Please refer Lecture 51@13:54)

QUESTION 5:

Micro-grids can detach from the main smart grids at any point of time without disrupting the core grid.

a. True
b. False

Correct Answer: a. True

Detailed Answer: Micro-grids can detach from the main smart grids at any point of time without disrupting the core grid.

Which of the following properties of smart grids is responsible for controlling appliances?

a. Distributed generation
b. Consumer participation
c. Power system efficiency
d. Power quality

Correct Answer: b. Consumer participation

Detailed Answer: Consumer participation facilitates real-time monitoring and consumption, controlling appliances, and enabling automation. (Please refer Lecture 51@21:34)

QUESTION 7:

Which of the following does the property of maintaining power quality in smart grids facilitate?

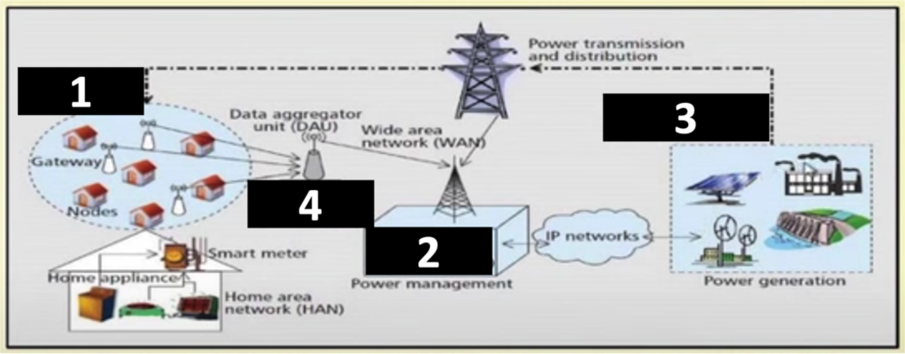
a. Power monitoring
b. Integration of renewable energy sources
c. Load forecasting
d. Automation

Correct Answer: c. Load forecasting

Detailed Answer: The property of power quality facilitates self-healing, frequency monitoring and control, load forecasting, and anticipating disturbances. (Please refer Lecture 51@21:44)

QUESTION 8:

Which of the following boxes in the diagram represents metering data buffer?



a. 1
b. 2
c. 3
d. 4

Correct Answer: d. 4

Detailed Answer: Box 4 represents metering data buffer. (Please refer Lecture 51@23:14)

QUESTION 9:

Which of the following helps in minimizing energy use in smart homes when the power grid is under stress?

a. Interactive relationship
b. Computerized control
c. Smart meters
d. All of these

Correct Answer: b. Computerized control

Detailed Answer: Computerized control helps in minimizing energy use in smart homes when the power grid is under stress. (Please refer Lecture 51@27:34)

QUESTION 10:

Which of the following provides the smart grids an interface between the consumers and the energy service providers?

a. Smart meters
b. Graphical user interface (GUI)
c. Automated controls
d. None of these

Correct Answer: a. Smart meters

Detailed Answer: Smart meters provide the smart grids an interface between the consumers and the energy service provider. (Please refer Lecture 51@28:54)

Industry 4.0 and IIoT are subsets of IoT.

a. True
b. False

Correct Answer: b. False

Detailed Answer: IIoT is an intersection of Industry 4.0 and IoT. (Please refer Lecture 53@04:01)

QUESTION 12:

Which of the following does IoT deal with?

a. Enterprise IoT
b. Consumer IoT
c. Both enterprise and consumer IoT
d. Neither enterprise nor consumer IoT

Correct Answer: b. Consumer IoT

Detailed Answer: IoT deals with consumer IoT, while IIoT deals with enterprise IoT. (Please refer Lecture 53@06:01)

QUESTION 13:

Which of the following approaches does IIoT rely on?

- a. Wrap and re-use
- b. Rip and replace
- c. Wrap and replace
- d. Rip and re-use

Correct Answer: a. Wrap and re-use

Detailed Answer: IIoT relies on the wrap and re-use approach. (Please refer Lecture 53@06:51)

QUESTION 14:

Reorder the following in order of their occurrence.

1. Internet evolution and automation
2. Industrial Internet of Things
3. Mechanized production
4. Mass production

a. 3, 1, 4, 2
b. 4, 3, 1, 2
c. 3, 4, 1, 2
d. 3, 2, 4, 2

Correct Answer: c. 3, 4, 1, 2

Detailed Answer: The order of occurrence is: Mechanized production, Mass production, Internet evolution and automation, and Industrial Internet of Things (Please refer Lecture 53@10:01)

QUESTION 15:

Which of the following V's in big data represents the truthfulness of the data?

a. Value
b. Veracity
c. Variability
d. Velocity

Correct Answer: b. Veracity

Detailed Answer: Veracity represents the truthfulness of the data. (Please refer Lecture 53@10:14)

************END***********

Introduction to Internet of Things

Assignment-Week 12

TYPE OF QUESTION: MCQ/MSQ

Number of questions: **15** **Total marks: 15 X 1= 15**

QUESTION 1:

How many types of data analysis exist?

a. 1
b. 2
c. 3
d. 4

Correct Answer: b. 2.
Detailed Answer: There are two types of data analysis: qualitative and quantitative analysis. (Please refer Lecture 56@2:42)

QUESTION 2:

Which of the following deals with categorical data?

a. Qualitative
b. Quantitative
c. Both qualitative and quantitative
d. Neither qualitative nor quantitative

Correct Answer: a. Qualitative
Detailed Answer: Qualitative deals with categorical data, while quantitative deals with numerical data. (Please refer Lecture 56@2:42)

Which of the following does not fall under the principles of quantitative analysis?

- a. Notice things
- b. Collect things
- c. Predict things
- d. Think about things

Correct Answer: c. Predict things

Detailed Answer: Notice, collect, and think about things are the three basic principles of quantitative analysis. (Please refer Lecture 56@4:12)

QUESTION 4:

Which of the following uses statistical analysis for making descriptions?

a. Qualitative
b. Quantitative
c. Both qualitative and quantitative
d. Neither qualitative nor quantitative

Correct Answer: b. Quantitative

Detailed Answer: Quantitative analysis makes use of statistics (mean, median, and mode) in describing the data. (Please refer Lecture 56@4:33)

QUESTION 5:

Which of the following is true?

a. Quantitative: Precision, Error limits; Qualitative: Interview, Field notes
b. Quantitative: Precision, Field notes; Qualitative: Interview, Error limits
c. Quantitative: Precision, Error limits; Qualitative: Interview, Data dispersion
d. Quantitative: Precision, Data dispersion; Qualitative: Interview, Error limits

Correct Answer: a. Quantitative: Precision, Error limits; Qualitative: Interview, Field notes

Detailed Answer: Qualitative analysis involves interviews, audio/video recordings, and field notes. Quantitative analysis utilizes statistical analysis methods. (Please refer Lecture 56@4:33)

Which of the following is true for qualitative analysis?

a. Volume, weight, color
b. Smell, taste, weight
c. Volume, weight, taste
d. Smell, taste, color

Correct Answer: d. Smell, taste, color

Detailed Answer: Examples of qualitative analysis include smell, taste, color, and others. On the other hand, quantitative analysis includes volume, weight, and others. (Please refer Lecture 56@5:33)

QUESTION 7:

Visualizing data helps in speeding up the decision-making process.

a. True
b. False

Correct Answer: a. True

Detailed Answer: Visualizing data helps in speeding up the decision-making process. (Please refer Lecture 56@6:13)

QUESTION 8:

In statistical model representation of the form (X, P), what does P represent?

a. Possible observations
b. Set of probability distributions on X
c. Set of probability distributions on U (U is the universal set)
d. Probabilities of occurrences

Correct Answer: b. Set of probability distributions on X

Detailed Answer: In statistical models of the form (X, P), X represents all possible observations and P represents the probability distribution on X. (Please refer Lecture 56@7:23)

QUESTION 9:

Which of the following is true for a complete model in statistics?

- a. The number of equations and variables should be same
- b. The number of equations and variables should be different
- c. The number of equations and variables does not matter
- d. None of these

Correct Answer: a. The number of equations and variables should be same.

Detailed Answer: In complete model, the number of equations and variables should be the same. (Please refer Lecture 56@8:23)

In contrast to qualitative models, statistical models do not require descriptive methods.

a. True
b. False

Correct Answer: b. False.

Detailed Answer: Statistical models require descriptive methods. (Please refer Lecture 56@8:43)

Fill in the blank. ANOVA is best suited for comparing __________ populations or samples.

a. More than 1
b. More than 2
c. More than 3
d. Depends on the population

Correct Answer: b. More than 2

Detailed Answer: ANOVA is best suited for comparing more than 2 populations or samples. (Please refer Lecture 56@09:13)

QUESTION 12:

Which of the following probability distributions for the populations in ANOVA?

a. Poisson distribution
b. Bernoulli distribution
c. Normal distribution
d. Does not matter

Correct Answer: c. Normal distribution

Detailed Answer: ANOVA requires its populations to be normally distributed. (Please refer Lecture 56@09:13)

QUESTION 13:

Which of the following is true for null hypothesis in F-ratio?

a. Greater than 1 for true and 1 for false
b. Greater than 1 for false and 1 for true
c. Greater than 0 for true and 0 for false
d. Greater than 0 for false and 0 for true

Correct Answer: b. Greater than 1 for false and 1 for true

Detailed Answer: The null hypothesis in F-ratio returns 1 for true and greater than 1 for false. (Please refer Lecture 56@12:23)

QUESTION 14:

Fill in the blank. When all the data is same, the value of statistical dispersion is _______.

a. 0
b. 1
c. 2
d. 3

Correct Answer: a. 0
Detailed Answer: The value of statistical dispersion is 0 when data is same and increases as the data starts getting diverse. (Please refer Lecture 56@13:13)

QUESTION 15:

Which of the following represents squared deviation of a random variable from mean?

a. Range
b. Average absolute deviation
c. Variance
d. Standard deviation

Correct Answer: c. Variance

Detailed Answer: Variance represents the squared deviation of a random variable from the mean. (Please refer Lecture 56@14:13)

************END***********