



**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 is a static mechanism for address allocation of IoT nodes?

- a. Configuration over a management interface
- b. IPv6 address based on a hardware identifier
- c. Both configuration over a management interface & based on a hardware identifier
- d. IoT nodes can't be configured statically

Correct Answer: c. Both configuration over a management interface & based on a hardware identifier

Detailed Solution: IoT nodes can be statically configured in different ways, such as an address can be configured over a management interface, or a node may use IPv6 address based on a hardware identifier.

See lecture 2 (IPv6 Addressing Strategies)

QUESTION 2:

Which of the following error is commonly found in heating of metal strips?

- a. quantization error
- b. aliasing error
- c. hysteresis error
- d. None of these

Correct Answer: c. hysteresis error

Detailed Solution: A hysteresis error causes the sensor output value to vary depending on the sensor's previous input values. It is typically found in analog sensors, magnetic sensors, heating of metal strips.

See lecture 3 (Sensing)

QUESTION 3:

Identify the component shown below.



- a. Gas sensor
- b. PIR sensor
- c. Light sensor
- d. Speaker

Correct Answer: b. PIR sensor

Detailed Solution: Passive infrared (PIR) sensors use a pair of pyroelectric sensors to detect infrared energy radiating from objects within their field of vision.

QUESTION 4:

“X” performs active application layer functions between IoT nodes and other entities. What is X?

- a. IoT node
- b. IoT proxy
- c. IoT gateway
- d. IoT Network

Correct Answer: b. IoT proxy

Detailed Solution: IoT proxy is an entity that performs an active application layer function between IoT nodes, and other entities. The IoT proxy can be collocated with the IoT gateway.

See lecture 2



QUESTION 5:

Which of the following field in IPv4 header format indicates that it is concerned with reliable transmission?

- a. Traffic class
- b. Hop limit
- c. Fragment offset
- d. Destination address

Correct Answer: c. Fragment offset

Detailed Solution: The IPv4 emphasizes more on reliable transmission, as is evident by fields, such as type of service, total length, id, offset, TTL, checksum fields.

See lecture 2

QUESTION 6:

Which of the following is a function of IoT Gateway?

- a. Data forwarding
- b. Device management
- c. Protocol conversion
- d. All of these

Correct Answer: d. All of these

Detailed Solution: An IoT gateway performs several critical functions, like switching, routing, translating protocols, firewall & VPN services, security, data forwarding, managing device, and filtering data.

See lecture 2 & 5

QUESTION 7:

Which of the following actuator converts pressure into force?

- a. Mechanical actuators
- b. Pneumatic actuators
- c. Electric actuators
- d. Magnetic actuators



Correct Answer: b. Pneumatic actuators

Detailed Solution: Pneumatic actuators enable large forces to be produced from relatively small pressure changes (e.g., Pneumatic brakes are very responsive to small changes in pressure applied by the driver)

See lecture 4 (Actuation)

QUESTION 8:

Which of the following mechanism for address autoconfiguration provide more control on the allocated addresses?

- a. DHCPv6
- b. SLAAC
- c. Both DHCPv6 and SLAAC
- d. None of these

Correct Answer: a. DHCPv6

Detailed Solution: DHCPv6 can be used to explicitly configure IPv6 addresses to nodes, thereby providing network administrators with added control over the nodes on their networks.

See lecture 2 (IPv6 Addressing Strategies)

QUESTION 9:

Which of the following can measure position?

- a. Potentiometer
- b. Encoder
- c. Both potentiometer & encoder
- d. None of these

Correct Answer: c. Both potentiometer & encoder

Detailed Solution: A potentiometer sensor measures the distance or displacement of an object in a linear or rotary motion and converts it into an electrical signal. An encoder is an electromechanical device that can measure motion or position.

See lecture 3 (Sensing)



QUESTION 10:

In a scenario when the IoT proxy has uplink connectivity, does the IoT LAN need global addressing mandatorily?

- a. Yes
- b. No
- c. Not applicable

Correct Answer: b. No

Detailed Solution: When the IoT proxy has uplink connectivity, it proxies communication between the local IoT nodes and nodes in the external network. In this scenario, where all communications go through a proxy, the IoT LAN does not need global addressing, but can manage with link-local or ULA addresses, depending on the type of proxy.

See lecture 2 (IPv6 Addressing Strategies)

QUESTION 11:

Which of the following is TRUE?

- a. M2M is not a subset of IoT
- b. WoT and IoT are same
- c. IoT and M2M are same
- d. None of these

Correct Answer: d. None of these

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. IoT and WoT aren't same.

See lecture 1



QUESTION 12:

Statement I: Aliasing error occurs if the input variable or added noise changes periodically at a frequency proportional to the multiple of the sampling rate.

Statement II: If the signal is monitored digitally, the sampling frequency can cause a dynamic error triggering aliasing error.

- a. Both Statement I and II are false
- b. Both Statement I and II are true
- c. Statement I is false but Statement II is true
- d. Statement I is true but Statement II is false

Correct Answer: b. Both Statement I and II are true

Detailed Solution: If the signal is monitored digitally, the sampling frequency can cause a dynamic error, or if the input variable or added noise changes periodically at a frequency proportional to the multiple of the sampling rate, aliasing errors may occur.

See lecture 3 (Sensing)

QUESTION 13:

Does polymer-based actuator find application in manufacturing artificial muscles?

- a. Yes
- b. No

Correct Answer: a. Yes

Detailed Solution: Shape memory polymer (SMP) actuators function similar to our muscles, even providing a response to a range of stimuli such as light, electrical, magnetic, heat, pH, and moisture changes.

See lecture 4

QUESTION 14:

Unique Local Addresses are intended to allow routing over a network that expands over multiple links and routing hops, and even can expand over multiple networks. Can these addresses prevent address collision?

- a. Yes
- b. No
- c. Not Applicable



Correct Answer: a. Yes

Detailed Solution: Unique Local Addresses are designed to be used in local networks larger than a single link, but not for communications through the Internet. However, these are designed to provide adequate uniqueness in order to have extremely small risk of address collision.

See lecture 2 (IPv6 Addressing Strategies)

QUESTION 15:

Which of the following is an example of vector sensor?

- a. Pressure sensor
- b. Strain sensor
- c. Both pressure and strain sensors
- d. Sound sensor

Correct Answer: d. Sound sensor

Detailed Solution: Physical quantities such as sound, image, velocity, acceleration, orientation, etc. are all vector quantities, as only their magnitude is not sufficient to convey the complete information.

See lecture 3 (Sensing)

*****END*****



**Introduction to
Internet of Things
Assignment-Week 2**

TYPE OF QUESTION: MCQ/MSQ

Number of questions: 15

Total marks: 15 X 1= 15

QUESTION 1:

Which of the following protocol is used to implement device management for mobile devices?

- a. OMA-DM
- b. Websocket
- c. Alljoyn
- d. DNS-SD

Correct Answer: a. OMA-DM

Detailed Solution: OMA-DM is a protocol specified by the Open Mobile Alliance and is often used in the context of complex structured mobile solutions. It is often preferred by service providers to implement device management for mobile devices.

See lecture 6

QUESTION 2:

In LOADng, can intermediate routers respond to Route Requests (RREQs)?

- a. Yes, in any case
- b. Yes, only when RREQ flooding occurs
- c. Yes, only if they have active routes to the sought destination
- d. No

Correct Answer: d. No

Detailed Solution: Intermediate LOADng Routers are explicitly prohibited from responding to RREQs, even if they may have active routes to the sought destination.

See lecture 10



QUESTION 3:

Which of the following functions as the network bridge in IEEE 802.15.4 network?

- a. PAN Coordinator
- b. Router
- c. Device
- d. None of these

Correct Answer: a. PAN Coordinator

Detailed Solution: Every IEEE 802.15.4 network has a minimum of one coordinator device type who acts as the root; it also functions as the network bridge. The coordinator performs data handling and storing operations.

See lecture 9

QUESTION 4:

Which of the following allow communication between Zigbee and no-Zigbee devices?

- a. layer-5 application-level bridge
- b. layer-7 application-level gateway
- c. layer-7 application-level bridge
- d. layer-5 application-level gateway

Correct Answer: b. layer-7 application-level gateway

Detailed Solution: In order to enable communication between Zigbee and no-Zigbee devices, a layer-7 application-level gateway has to be created, which is quite complex.

Refer to the book: S. Misra, A. Mukherjee, and A. Roy, 2020. Introduction to IoT. Cambridge University Press.

QUESTION 5:

Statement I: RFIDs are radio-frequency-based.

Statement II: RFID devices can act as both readers as well as tags.

Which one of the following is correct?

- a. Statement I is true but Statement II is false
- b. Statement I is false but Statement II is true
- c. Both the statements are true
- d. Both the statements are false

Correct Answer: a. Statement I is true but Statement II is false

Detailed Solution: RFIDs are primarily radio-frequency-based, which can work even when they are not visible. These devices can't act as both readers as well as tags.

See lecture 10



QUESTION 6:

In AMQP, which of the following functionality defines its component “exchange”?

- a. linkage between various queues
- b. receives messages from various queues
- c. defines rules for message routing to various queues
- d. routing the messages to various queues

Correct Answer: d. routing the messages to various queues

Detailed Solution: Messages are not posted directly in the queue; rather, the user sends messages to the exchange. An exchange is responsible for routing the messages to the various queues.

See lecture 8

QUESTION 7:

Which of the following is designed to have low overhead and better scalability in terms of dense networks?

- a. LOADng
- b. RPL
- c. Both LOADng and RPL
- d. AODV

Correct Answer: b. RPL

Detailed Solution: RPL is designed to have low overhead and better scalability in terms of dense networks. See lecture 10

QUESTION 8:

Which of the following AMQP frame type controls the message flow rate?

- a. Transfer
- b. Flow
- c. Control
- d. Disposition

Correct Answer: b. Flow

Detailed Solution: “Flow” frame type controls the message flow rate. See lecture 8



QUESTION 9:

Does 6LoWPAN allow interoperability between IEEE802.15.4-based wireless devices and other IP-based 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.

Refer to the book: S. Misra, A. Mukherjee, and A. Roy, 2020. Introduction to IoT. Cambridge University Press.

QUESTION 10:

In the context of XMPP, which of the following correctly defines BOSH?

- a. XML streaming
- b. HTTP binding
- c. Both XML streaming and HTTP binding
- d. Binary encoding

Correct Answer: b. HTTP binding

Detailed Solution: BOSH is the HTTP binding for XMPP communications that is intended to be used in situations where a device or client is unable to maintain a long-lived TCP connection to an XMPP server.

See lecture 7

QUESTION 11:

Does MQTT support event-driven architecture?

- a. Yes
- b. No

Correct Answer: a. Yes

Detailed Solution: MQTT protocol uses a publish/subscribe architecture. Publish/subscribe is event-driven and enables messages to be pushed to clients. See lecture 6



QUESTION 12:

Which of the following is the acronym for “Extensible Messaging and Presence Protocol”?

- a. EMPP
- b. XMLP
- c. XMPP
- d. XMP

Correct Answer: c. XMPP

Detailed Solution: XMPP stands for Extensible Messaging and Presence Protocol. See lecture 7

QUESTION 13:

An IoT network requires communication mechanism, which is capable of synchronous as well as asynchronous communication. The mechanism should support both request-response, as well as publish-subscribe models. Which of the following protocol would be best suited for such a mechanism?

- a. AMQP
- b. CoAP
- c. MQTT
- d. None of these

Correct Answer: b. CoAP

Detailed Solution: CoAP is capable of synchronous as well as asynchronous communication. It supports both request-response as well as publish-subscribe models.

Refer to the book: S. Misra, A. Mukherjee, and A. Roy, 2020. Introduction to IoT. Cambridge University Press.

QUESTION 14:

Which of the following technique is used to transmit data frames in Beacon-enabled IEEE 802.15.4 networks?

- a. unslotted CSMA/CA
- b. slotted CSMA/CA
- c. unslotted CSMA/CD
- d. slotted CSMA/CD

Correct Answer: b. slotted CSMA/CA

Detailed Solution: The periodic transmission of beacon messages characterizes beacon enabled networks. Here, the data frames are sent via slotted CSMA/CA with a super-frame structure managed by a personal area network (PAN) coordinator.

See lecture 9



QUESTION 15:

What is the maximum size of hop limit in 6LoWPAN packet format?

- a. 8-bit unsigned integer
- b. 16-bit unsigned integer
- c. 8-bit signed integer
- d. 16-bit signed integer

Correct Answer: a. 8-bit unsigned integer

Detailed Solution: Hop limit in 6LoWPAN packet format allows up to 8-bit unsigned integer. Decremented by 1 by each node that forwards the packet. The packet is discarded if Hop Limit is decremented to zero.

See lecture 10

*****END*****

Week 3 : Assignment 3

The due date for submitting this assignment has passed.

Due on 2022-08-17, 23:59 IST.

Assignment submitted on 2022-08-17, 10:56

1 point

Which of the following handles packets, paging and inquiry in Bluetooth?

- a. L2CAP
- b. Baseband
- c. RFCComm
- d. Physical Radio

a
 b
 c
 d

Yes, the answer is correct.

Score: 1

Accepted Answers:

b

1 point

Which of the following incorporates channel hopping after every packet transmission?

- a. Zigbee
- b. WirelessHART
- c. 6LoWPAN
- d. None of these

a
 b
 c
 d

Yes, the answer is correct.

Score: 1

Accepted Answers:

b

1 point

In “X” protocol, a central network controller device sets-up a network with 1 Network ID and multiple node IDs for the devices in it. The nodes with different Network IDs cannot communicate with each other. What is “X”?

- a. Z-wave
- b. Zigbee
- c. Bluetooth
- d. ISA 100.11A

a
 b
 c
 d

Yes, the answer is correct.

Score: 1

Accepted Answers:

a

1 point

In the context of Sensor Web, SensorML stands for _____.

- a. Sensor Modeling language
- b. Sensor Machine language
- c. Sensor Markup language
- d. None of the above

a
 b
 c
 d

Yes, the answer is correct.

Score: 1

Accepted Answers:

a

1 point

Which of the following protocol is best suited to provide interference-free communication while minimizing latency and ensuring quality of service?

- a. WirelessHART
- b. ISA100.11A
- c. Both WirelessHART and ISA100.11A
- d. None of these

a
 b
 c
 d

No, the answer is incorrect.

Score: 0

Accepted Answers:

b

1 point

Which of the following solution approach is used to overcome the limitation of ineffective wakeup and sensing under rare event monitoring scenario in social sensing?

- a. Duty-cycle management
- b. Sleep-cycle management
- c. Packet transmission management
- d. Both duty-cycle and sleep-cycle management

a
 b
 c
 d

Yes, the answer is correct.

Score: 1

Accepted Answers:

a

1 point

Which of the following technique Bluetooth master uses to avoid collisions during transmission in a Piconet?

- a. Frequency Division Multiplexing
- b. Frequency Hopping Spread Spectrum
- c. Time Division Multiplexing
- d. Direct Sequence Spread Spectrum

a
 b
 c
 d

Yes, the answer is correct.

Score: 1

Accepted Answers:

c

1 point

Which of the following limitation is faced by total co-operation in Wireless Ad Hoc and Sensor Networks?

- a. Decreasing network throughput
- b. Decreasing energy
- c. Both (a) and (b)
- d. No limitation exists

a
 b
 c
 d

No, the answer is incorrect.

Score: 0

Accepted Answers:

b

1 point

Which of the following can function over a reliable packet transfer protocol?

- a. L2CAP
- b. Service Discovery Protocol
- c. RFCComm
- d. Physical Radio

a
 b
 c
 d

Yes, the answer is correct.

Score: 1

Accepted Answers:

b

1 point

In which of the following mode, NFC devices can act as both readers as well as tags?

- a. Reader/writer
- b. P2P
- c. Emulation
- d. NFC devices can't act as both readers as well as tags

a
 b
 c
 d

No, the answer is incorrect.

Score: 0

Accepted Answers:

c

1 point

In WSN, Information theoretic self-management (INTSEM) controls the transmission rate of a node by adjusting a node's _____.

- a. Duty cycle
- b. Lifetime
- c. Sleep time
- d. Can't control the transmission rate

- a
- b
- c
- d

Yes, the answer is correct.

Score: 1

Accepted Answers:

c

1 point

Which of the following layer of ISA 100.11A supports mesh routing?

- a. Network layer
- b. Data link layer
- c. Transport layer
- d. MAC layer

- a
- b
- c
- d

Yes, the answer is correct.

Score: 1

Accepted Answers:

b

1 point

Which of the following is used to avoid interference-prone channels in HART?

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

- a
- b
- c
- d

Yes, the answer is correct.

Score: 1

Accepted Answers:

b

1 point

When the devices are not in range, messages are routed through different nodes to bypass obstructions created by household appliances or layouts. Which of the following exhibit such characteristic of avoiding radio dead-spots?

- a. Bluetooth
- b. 6LoWPAN
- c. Z-wave
- d. Zigbee

- a
- b
- c
- d

Yes, the answer is correct.

Score: 1

Accepted Answers:

c

1 point

Which of the following is TRUE in terms of power (in mW) and range (in m) of the classes of Bluetooth devices?

- a. Class-1: Power=100mW, Range=100m
- b. Class-2: Power=2.5 mW, Range=100m
- c. Class-1: Power=2.5 mW, Range=100m
- d. Class-2: Power=100 mW, Range=100m

- a
- b
- c
- d

Yes, the answer is correct.

Score: 1

Accepted Answers:

a



**Introduction to
Internet of Things
Assignment-Week 4**

TYPE OF QUESTION: MCQ/MSQ

Number of questions: 15

Total marks: 15 X 1= 15

QUESTION 1:

Which of the following UAV topology is self-configuring?

- a. Mesh
- b. Star
- c. Both mesh and star
- d. Grid

Correct Answer: a. Mesh

Detailed Solution: Star topology is not self-configuring, while mesh topology is self-configuring.

See lecture 19

QUESTION 2:

In WMSNs application, which of the following deployment can provide better sensing and prolong network lifetime?

- a. Scalar sensor nodes
- b. Camera sensor nodes
- c. Both scalar and camera sensor nodes
- d. Vector sensor nodes

Correct Answer: c. Both scalar and camera sensor nodes

Detailed Solution: In WMSNs application, deployment of both camera sensor and scalar sensor nodes can provide better sensing and prolong network lifetime. Camera sensor

See lecture 16



QUESTION 3:

In which of the following algorithms only a subset of nodes in the WASN participate in sensing, communication, and computation?

- a. Localized
- b. Distributed
- c. Centralized
- d. All of these

Correct Answer: a. Localized

Detailed Solution: Localized algorithms are a special type of distributed algorithms where only a subset of nodes in the WASN participate in sensing, communication, and computation.

See lecture 17

QUESTION 4:

In general, the target-tracking problem consists of a WSN, whose nodes are strategically or randomly deployed across the sensor field. Is the statement true?

- a. Yes
- b. No

Correct Answer: a. Yes

Detailed Solution: According to several authors, the target-tracking problem consists of a WSN, whose nodes are strategically or randomly deployed across the sensor field.

See lecture 16 [Research Paper: Souza, Éfren L., Eduardo F. Nakamura, and Richard W. Pazzi. "Target tracking for sensor networks: A survey." ACM Computing Surveys (CSUR) 49, no. 2 (2016): 1-31.]

QUESTION 5:

In Ad-Hoc FANETs, which of the following set-up can be considered as ground network?

- a. Stationary WSNs
- b. Control stations
- c. VANETS
- d. All of these

Correct Answer: d. All of these

Detailed Solution: In Ad-Hoc FANETs, ground networks may be stationary WSNs or VANETS or Control stations.

See lecture 19



QUESTION 6:

Which of the following components in M2M monitors the status of devices and M2M area networks, and controls them based on their status?

- a. M2M User Platform
- b. M2M Device Platform
- c. M2M Service Platform
- d. M2M Access Platform

Correct Answer: b. M2M Device Platform

Detailed Solution: M2M device platform manages device profiles, such as location, device type, address, and description. It monitors the status of devices and M2M area networks, and controls them based on their status.

See lecture 20

QUESTION 7:

In the guided target-tracking problem formulation, a tracker is added to the problem. The tracker follows the trajectory defined by beacon nodes to intercept the target. Which of the following objectives best define this tracking algorithm?

- a. to fuse data about the target
- b. to use the least amount of communication to reach the target
- c. to reach the target in the shortest possible time
- d. to increase the network lifetime

Correct Answer: c. to reach the target in the shortest possible time

Detailed Solution: The tracker can be a person or a guided vehicle that receives the position of the target from the network so that it can move toward the target. The objective is to reach the target in the shortest possible time.

See lecture 16

QUESTION 8:

In gateway selection algorithm in FANETs, each UAV acquires the information of all UAVs within its _____ hop(s).

- a. One
- b. Two
- c. More than one
- d. Can't be specific

Correct Answer: b. Two

Detailed Solution: In gateway selection algorithm in FANETs, gateway selection is initiated by selection of the most stable node in the sub-area. Each UAV acquires the information of all UAVs within its 2 hops.



See lecture 19

QUESTION 9:

A crossing is covered if it is in the _____ region of at least one node's coverage disk.

- a. exterior
- b. interior
- c. either exterior or interior
- d. boundary

Correct Answer: b. interior

Detailed Solution: Crossings are the intersection points between disk boundaries or between monitored space boundary and disk boundaries. A crossing is covered if it is in the interior region of at least one node's coverage disk.

See lecture 17

QUESTION 10:

There are several major challenges related to target-tracking applications. Which of the following is NOT among those challenges?

- a. target recovery
- b. node non-cooperation
- c. future-position estimation
- d. energy management

Correct Answer: b. node non-cooperation

Detailed Solution: Authors identified six major challenges related to target-tracking applications. These are target detection, target recovery, energy management, position computation, node cooperation, and future-position estimation. Node cooperation is one of the challenges, in which nodes cooperate and fuse data, reducing the number of messages.

See lecture 16

QUESTION 11:

Which of the following components in M2M manages inquiry?

- a. M2M User Platform
- b. M2M Device Platform
- c. M2M Service Platform
- d. M2M Access Platform

Correct Answer: a. M2M User Platform



Detailed Solution: M2M User Platform manages M2M service user profiles and provides functionalities such as, user registration, modification, charging, and inquiry.
See lecture 20

QUESTION 12:

Which of the following is NOT regarded as one of the major scatters of underwater sound in Underwater Acoustic Sensor Networks?

- a. Non-linear internal waves
- b. Solitons
- c. Linear internal waves
- d. None of these

Correct Answer: c. Linear internal waves

Detailed Solution: In a layered shallow oceanic region, the inclusion of the effect of internal solitons on the performance of the network is important. Based on various observations, it is proved that non-linear internal waves, i.e., Solitons are one of the major scatters of underwater sound.

See lecture 16

QUESTION 13:

In Optimal Geographical Density Control (OGDC) algorithm, a node _____ if its coverage area is completely covered.

- a. wakes up
- b. starts listening
- c. sleeps
- d. backs off

Correct Answer: c. sleeps

Detailed Solution: In OGDC, a node closest to the optimal location becomes active. A node sleeps if its coverage area is completely covered.

See lecture 17

QUESTION 14:

Which of the following elements of target-tracking algorithm can perform data fusion?

- a. Active node
- b. Inactive node
- c. Beacon node
- d. Sink node



Correct Answer: d. Sink node

Detailed Solution: A sink node is the intermediary between the network and application user. It is a special node with high processing power and storage. It can perform data fusion. See lecture 16 [Research Paper: Souza, Éfren L., Eduardo F. Nakamura, and Richard W. Pazzi. "Target tracking for sensor networks: A survey." ACM Computing Surveys (CSUR) 49, no. 2 (2016): 1-31.]

QUESTION 15:

Which of the following components of Mobile Wireless Sensor Networks (MWSN) moves in order to collect data from sensor nodes?

- a. Mobile sensor node
- b. Data mule
- c. Mobile sink
- d. Both data mule and mobile sink

Correct Answer: d. Both data mule and mobile sink

Detailed Solution: Mobile Sink moves in order to collect data from sensor nodes. A data mule also moves to collect the data from sensor nodes and goes to the sink to deliver the collected data.

See lecture 18

*****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:

Fill in the blank.

UMB consists of _____.

- a. UMB-A and UMB-C
- b. UMB-A and UMB-B
- c. UMB-B and UMB-C
- d. UMB-A and UMB-E

Correct Answer: a. UMB-A and UMB-B

Detailed Solution: UMB consists of UMB-Core (UMB-C) and UMB-Adaptor (UMB-A). See lecture 21 @25:50.

QUESTION 2:

Fill in the blank.

UMB creates virtual maps among the _____ of all middleware home networks.

- a. Virtual devices
- b. Physical devices
- c. Heterogeneous devices
- d. Services

Correct Answer: b. Physical devices

Detailed Solution: UMB creates virtual maps among the physical devices of all the home networks such as HAVI, Jini, LonWorks, and UPnP.
See lecture 21 @ 25:15.



QUESTION 3:

Which of the following is the functionality of UMB adaptors?

- a. Translate local middleware's message into global metadata's message.
- b. Translate global middleware's message into global metadata's message.
- c. Translate local middleware's message into local metadata's message.
- d. Translate global middleware's message into local meta-data's message.

Correct Answer: a . Translate local middleware's message to global meta-data message.

Detailed Solution: UMB converts physical devices into virtually abstracted one and translates local middleware's message into global metadata's message.

See lecture 21 @ 27:17.

QUESTION 4:

Which of the following is true?

- a. Relay is an actuator that uses electromagnetic effect to act as a switch.
- b. Relay can open and close circuit when electricity is passed through it.
- c. Relay can be used to control the power supply to any other connected device.
- d. All of these.

Correct Answer: d. All of these.

Detailed Solution: From the basics of relay interface with NodeMCU.

Refer to the book: S. Misra, A. Mukherjee, and A. Roy, 2020. Introduction to IoT. Cambridge University Press.

QUESTION 5:

What is sketch?

- a. Program coded in IoT devices.
- b. Program coded in Arduino IDE.
- c. Services of Arduino Uno.
- d. Services of IoT devices

Correct Answer: b. Program coded in Arduino IDE.

Detailed Solution: Sketch is the program coded in Arduino IDE which mainly consists of two parts setup() and loop.

See lecture 22 @ 12:15



QUESTION 6:

What is function setup()?

- a. Point where code terminates.
- b. Point where code starts.
- c. It iterates the task in the program.
- d. None of the above.

Correct Answer: b. Point where code starts.

Detailed Solution: As per the basics of Arduino programming.

See lecture 22 @ 13:52

QUESTION 7:

Which of the following is true for the given command?

`random(10);`

- a. Gives random number within the range [0, 10]
- b. Gives random number within the range [1, 10]
- c. Gives random number within the range [0, 9]
- d. Reset the pseudo-random number generator with seed value 10

Correct Answer: a. Gives random number within the range [0, 10]

Detailed Solution: As per the basics of Arduino programming.

See lecture 23 @ 10:10

QUESTION 8:

Which kind of conflict occur when different processing logics are applied to same IoT networked devices or applications?

- a. Semantic conflict.
- b. Syntactic conflict.
- c. System conflict.
- d. Device conflict.

Correct Answer: a. Semantic conflict

Detailed Solution: Semantic conflict occurs when different processing logics are applied to same IoT networked devices or applications.

See lecture 21 @ 5:20



QUESTION 9:

Which of the following is TRUE for the sketch command given below?

`delay(3000);`

- a. Provides a delay of 3000 seconds
- b. Provides a delay of 3 seconds
- c. Provides a delay of 3000 nano seconds
- d. Provides a delay of 3000 simulation time

Correct Answer: b. Provides a delay of 3 second

Detailed Solution: As per the basics of Arduino programming.

See lecture 22 @ 17:20

QUESTION 10:

Which of the following solutions are not responsible for generating unique address?

- a. Election Product Code (EPC)
- b. Unique Product Code (UPC)
- c. Uniform Resource Identifier (URI)
- d. IP Addresses

Correct Answer: b. Unique Product Code

Detailed Solution: As per the basics of device identification and categorization.

See lecture 21 @ 16:25

QUESTION 11:

How many digital I/O pins are there in Arduino Uno.

- a. 14
- b. 54
- c. 11
- d. 16

Correct Answer: a. 14

Detailed Solution: From the basics of Arduino Uno.

Refer to the book: S. Misra, A. Mukherjee, and A. Roy, 2020. Introduction to IoT. Cambridge University Press.



QUESTION 12:

Fill in the blank.

The interoperability between devices and device user in term of message formats is called _____.

- a. Systematic interoperability.
- b. Semantic interoperability.
- c. Syntactic interoperability.
- d. Device interoperability.

Correct Answer: c. Syntactic interoperability

Detailed Solution: The interoperability in terms of message formats is called syntactic interoperability.

See lecture 21 @ 17:00

QUESTION 13:

Fill in the blank.

_____ dynamically maps physical devices with different domains.

- a. Collaborative concept
- b. Middleware technology
- c. End devices
- d. Cloud

Correct Answer: b. Middleware

Detailed Solution: **Middleware technology** dynamically maps physical devices with different domains and based on the map, the devices can be discovered and controlled remotely.

See lecture 21 @ 18:45

QUESTION 14:

Which of the following ontology utilize previous data to estimate what is going to happen?

- a. Device ontology
- b. Physical domain ontology
- c. Estimation ontology
- d. Virtual domain ontology

Correct Answer: c. Estimation ontology

Detailed Solution: As per the basics of semantic interoperability for device interaction.

See lecture 21 @ 20:25



QUESTION 15:

Which component of UMB converts physical devices into virtually abstracted one, as described by Universal Device Template (UMB).

- a. UMB-A
- b. UMB-C
- c. UDT mapping
- d. UMB-B

Correct Answer: a. UMB-A

Detailed Solution: As per the definition of UMB-A.
See lecture 21 @ 28:00

*****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:

What is the value that is assigned to the variable f in the given piece of python code?
i, f, str=50, 50.68, “Welcome to python”

- a. 50
- b. 50.68
- c. Welcome to python
- d. All of these

Correct Answer: b. 50.68

Detailed Solution: As per program output. (Please refer to lecture INTRODUCTION TO PYTHON PROGRAMMING- I@ 09:07)

QUESTION 2:

What is the output of the following piece of python code?

```
x='17'  
y='23'  
z=x+y  
print(z)
```

- a. 40
- b. 6
- c. 1723
- d. 30

Correct Answer: c. 1723

Detailed Solution: As per program output. (Please refer to lecture INTRODUCTION TO PYTHON PROGRAMMING- I@ 21:05)



QUESTION 3:

Fill in the blanks. Raspbian is a/n _____

- a. Microcomputer
- b. Minicomputer
- c. Operating system
- d. Assembler

Correct Answer: c. Operating system

Detailed Solution: Raspbian is a free operating system for Raspberry Pi (Please refer to lecture INTRODUCTION TO RASPBERRY PI-I @ 12:14).

QUESTION 4:

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

```
t1 = 'Welcome to python coding'  
print(t1[8:14])
```

- a. to pyth
- b. SyntaxError: invalid syntax
- c. e to pyt
- d. to pyt

Correct Answer: d. to pyt

Detailed Solution: As per the basics of Python programming. (Please refer to lecture INTRODUCTION TO PYTHON PROGRAMMING- I @ 11:01)

QUESTION 5:

Fill in the blanks. Raspberry Pi 3 Model B has a GPU support of _____

- a. 400 MHz video core IV
- b. 250 MHz video core IV
- c. Quad cortex A53@1.2GHz
- d. ARM 11 @ 1 GHz

Correct Answer: a. 400 MHz video core IV

Detailed Solution: Raspberry Pi 3 Model B has a GPU support of 400 MHz video core IV. (Please refer to lecture INTRODUCTION TO RASPBERRY PI-I @ 6:00)



QUESTION 6:

Which of the following represents the command used for rebooting Raspberry Pi?

- a. sudo reboot
- b. sudo apt-get rebooting
- c. pip install rebooting
- d. All of these

Correct Answer: a. sudo reboot

Detailed Solution: As per the basics of Python programming. (Please refer to lecture INTRODUCTION TO RASPBERRY PI-I @ 26:53)

QUESTION 7:

State whether true or false.

It is not possible to return multiple values from a function in Python.

- a. True
- b. False

Correct Answer: b. False

Detailed Solution: In python programming it is possible to return multiple values. (Please refer to lecture INTRODUCTION TO PYTHON PROGRAMMING- I @ 24:41)

QUESTION 8:

What is the data type of the variable ls in the following piece of Python code?

```
ls= {1: "item", "key": "21", "year": 2022}
```

- a. dictionary
- b. list
- c. tuple
- d. All of these

Correct Answer: a. dictionary

Detailed Solution: As per the basics of Python programming (Please refer to lecture INTRODUCTION TO PYTHON PROGRAMMING- I @ 15:07).



QUESTION 9:

State whether true or false.

A function in Python may or may not return a value.

- a. True
- b. False

Correct Answer: a. True

Detailed Solution: As per the basics of Python programming (Please refer to lecture INTRODUCTION TO PYTHON PROGRAMMING- I @ 19:38).

QUESTION 10:

What are the basic modes to open a file in python?

- a. Read mode (r) and write mode (w)
- b. Append mode (a)
- c. Both read and write mode (r+)
- d. All of these

Correct Answer: d. All of these

Detailed Solution: As per basics of Python programming (Please refer to lecture INTRODUCTION TO PYTHON PROGRAMMING-II @ 2:58).

QUESTION 11:

What are the socket types that exist in Python based socket programming?

- a. AF_DG and SOCK_SM
- b. AF_UNIX and AF_INET
- c. SOCK_UX and SOCK_IT
- d. SOCK_DGRAM and SOCK_STREAM

Correct Answer: d. SOCK_DGRAM and SOCK_STREAM

Detailed Solution: SOCK_DGRAM and SOCK_STREAM are the socket types whereas AF_UNIX and AF_INET are socket families (Please refer to lecture INTRODUCTION TO PYTHON PROGRAMMING-II @ 23:57).



QUESTION 12:

Does Python support exception handling?

- a. Yes
- b. No

Correct Answer: a. Yes

Detailed Solution: As per basics of Python programming. (Please refer to lecture INTRODUCTION TO PYTHON PROGRAMMING-I @ 28:39).

QUESTION 13:

Which of the following must be used to terminate a loop and move to the next code after the loop?

- a. list
- b. try
- c. continue
- d. break

Correct Answer: d. break

Detailed Solution: As per basics of Python programming (Please refer to lecture INTRODUCTION TO PYTHON PROGRAMMING-I @ 29:37).

QUESTION 14:

Select the option that does not represent a keyword in Python language?

- a. while
- b. if
- c. try
- d. integer

Correct Answer: d. integer

Detailed Solution: integer is not a keyword (As per basics of Python programming).



QUESTION 15:

Raspberry Pi does not support any other language other than Python?

- a. True
- b. False

Correct Answer: b. False

Detailed Solution: The default programming language installed in Raspberry Pi include Python, C , C++, JAVA, Scratch and Ruby (Please refer to lecture INTRODUCTION TO PYTHON PROGRAMMING- I @ 22:26).

*****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:

You have an IoT temperature sensor that is sensing temperature from a particular location and sending the data over the network to a server situated far away in another city for storage. This is an example of remote data logging.

- a. True
- b. False

Correct Answer: a. True

Detailed Solution Remote data logging refers to the process of sending data and information from a client/sensor over the network to a remote server located somewhere else. Refer to lecture 31.

QUESTION 2:

For a two-way communication between a client and server, i.e both the client and the server send data to each other, it is important that both of them know about the following about each other

- a. Only the IP address of server
- b. Only the port number of client
- c. Both the IP address and port number
- d. Neither the IP address nor the port number

Correct Answer: c . GPIO pins of the RPi



Detailed Solution: Since it is a two-way communication, the client and server should both know about the IP address and the port number of each other in order to communicate. Refer to lecture 31.

QUESTION 3:

If you are using Raspberry Pi (RPi) to connect standard IoT sensors (such as DHT temperature sensors), which among the following components of the Raspberry Pi do you use to connect your Pi to your sensor for data transfer.

- a. HDMI port of the RPi
- b. MicroSD card slot of the RPi
- c. Ethernet LAN port of the RPi
- d. General Purpose Input Output (GPIO) pins of the RPi

Correct Answer: d. GPIO pins of the RPi

Detailed Solution: The GPIO pins of the RPi board are responsible for connecting the RPi to any external sensor/actuator. Refer to standard materials on RPi and Lecture 31.

QUESTION 4:

It is possible to connect a single DHT temperature sensor with a suitable number of connection wires with two Raspberry Pis acting as a client for the same sensor.

- a. True
- b. False

Correct Answer: a. True

Detailed Solution: You can connect any number of RPis to the same sensor, with each RPi acting as a separate client, provided you have a suitable number of connection wires.



QUESTION 5:

Which among the following denotes the correct connection order for a standard 4-PIN DHT sensor with the order of PIN numbers taken as 4,3,2,1 (from right to left)

- a. Data, Null, Ground, Power
- b. Ground, Data, Power, Null
- c. Ground, Null, Data, Power
- d. Power, Data, Null, Ground

Correct Answer: c. Ground, Null, Data, Power

Detailed Solution: This is the standard configuration for a 4-PIN DHT sensor. Refer Lecture 32 @ 3:30

QUESTION 6:

Using the matplotlib library in Python, you are plotting a graph of pressure values versus time, with pressure taken in the vertical axis and time taken in the horizontal axis. While writing the code to plot the graph, which among the following is the correct parameter (denoted by '??') that you can write within the function "ylabel(??)"

- a. Time
- b. Pressure
- c. Length
- d. Mass

Correct Answer: b. Pressure

Detailed Solution: The function ylabel() sets the name of the Y-axis, i.e the vertical axis of a graph. Since we are plotting pressure in the Y-axis, thus we should label it appropriately.



QUESTION 7:

Lack of centralized control is a problem and limitation of traditional network architectures without Software Defined Networking (SDN) support

- a. True
- b. False

Correct Answer: a. True

Detailed Solution: Traditional networks do not have a central authority over them, therefore many issues take time to get resolved with distributed algorithms. Refer Lecture 33, introduction to SDN.

QUESTION 8:

Detaching the physical hardware from the overlying software components, such as the Operating System (OS) and applications forms an important aspect of transitioning to SDN

- a. True
- b. False

Correct Answer: a. True

Detailed Solution: Refer Lecture 33, Introduction to SDN.



QUESTION 9:

Flow rules are stored within SDN switches that run the OpenFlow protocol in the following format.

- a. Images
- b. Files
- c. Tables
- d. None of these

Correct Answer: c. Tables

Detailed Solution: Flow rules are stored in tabular formats within the switches based on which packets get routed. Refer Lecture 33, discussions on Rule Placement

QUESTION 10:

Among the following, which is the most unlikely to be considered as a suitable candidate for a match-field for flow rules in SDN

- a. Source port number of the packet
- b. Destination IP address of the packet
- c. Temperature of the switch motherboard
- d. Destination MAC address.

Correct Answer: c. Temperature of the switch motherboard

Detailed Solution: The temperature of the motherboard of a switch generally has no role in deciding how a packet will be forwarded. Refer to discussions on Flow rules in Lecture 33.



QUESTION 11:

In SDN, the central controller of one network can communicate with the central controller of another SDN network through which of the following directional APIs

- a. East-West bound APIs
- b. Southbound APIs
- c. Westbound APIs
- d. None of these.

Correct Answer: a. East-West bound APIs

Detailed Solution: In SDN, East and West bound APIs are used for inter-controller communication in the control plane. Refer Lecture 34@1:56

QUESTION 12:

Suppose in SDN, there are two switches S1 and S2. The same packet P arrives in both the switches, S2 does not have the appropriate flow rule to forward this particular packet, whereas S1 has. Then with respect to the two switches, what is the correct action that is taken.

- a. S1 sends PACKET_IN to controller, S2 forwards the packet
- b. S2 sends PACKET_IN to controller, S1 forwards the packet
- c. Both S1 and S2 send PACKET_IN to controller
- d. Both S1 and S2 forward the packet.

Correct Answer: b. S2 sends PACKET_IN to controller, S1 forwards the packet

Detailed Solution: If a switch does not have an appropriate flow rule to process an incoming packet, it sends PACKET_IN message to the controller, whereas if the switch has the flow rule, it simply forwards the packet as per the flow rule. Refer lectures 33 and 34.



QUESTION 13:

No matter how big an SDN network becomes, we can never have more than one SDN controller.

- a. True
- b. False

Correct Answer: b. False

Detailed Solution: There is provision for splitting a single controller into multiple distributed but connected controllers in tree/ring/mesh topologies to manage a very large network. Refer Lecture 34, controller placement problem.

QUESTION 14:

With Software Defined IoT, it is possible to control the individual physical sensor and actuator nodes as well as rule placement of the backbone network remotely by suitable orchestration and software.

- a. Yes
- b. No

Correct Answer: a. Yes

Detailed Solution: SDIoT allows flexible control and management of the entire IoT network, from the physical devices to the backbone network. Refer Lecture 35, architecture of SDN for IoT.



QUESTION 15:

Soft-WSN that has been proposed as one of the solutions to Software Defined IoT achieves the following

- a. Only Device Management
- b. Only Topology Management
- c. Both Device and Topology Management
- d. Neither Device nor Topology Management

Correct Answer: c. Both Device and Topology Management

Detailed Solution: Soft-WSN that has been proposed by Bera et. Al (IEEE SJ'16) achieves both device and topology management efficiently. Refer Lecture 35@10:00 to 11:20

*****END*****



**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:

The process of abstracting physical network hardware and resources from the network services and use cases are known as

- a. Network Splitting
- b. Network Virtualization
- c. Network Scaling
- d. None of these

Correct Answer: b. Network Virtualization

Detailed Solution Network virtualization is the process by which various network services are abstracted from their underlying physical hardware for smooth management. Refer Lecture 36@4:00



QUESTION 2:

ODIN is one of the proposed solutions towards Software Defined WSN and mobility management. As per the architecture of ODIN, which component of ODIN is placed on top of the controller.

- a. ODIN master
- b. ODIN agent
- c. Both ODIN master and agent
- d. Neither ODIN Master and agent

Correct Answer: a. ODIN Master

Detailed Solution: ODIN Master is associated with the SDN controller. Refer Lecture 36@9:50 onwards

QUESTION 3:

Shared pool of resources with easy configurability are important aspects of cloud computing.

- a. True
- b. False

Correct Answer: a. True

Detailed Solution: Cloud computing deals with easy access of configurability of shared pool of computing resources over network. Refer Lecture 37



QUESTION 4:

In cloud computing, the users have specific knowledge about the exact physical location of the computing hardware with respect to the cloud services.

- a. True
- b. False

Correct Answer: b. False

Detailed Solution: In cloud computing, the users have no knowledge about the backend physical hardware orchestration and management. Refer Lecture 37.

QUESTION 5:

Suppose there are two organizations, A and B both of which provide cloud services. Any user can access the cloud of A free of cost whereas only employees of organization B can access the cloud of B. Also organization B has set up its cloud for only its own needs. With respect to the type of cloud infrastructure provided by A and B, which among the following is true

- a. A: Private Cloud, B: Public Cloud
- b. A: Public Cloud, B: Private Cloud
- c. A: Public Cloud, B: Public Cloud
- d. A: Private Cloud, B: Private Cloud

Correct Answer: b. A: Public Cloud, B: Private Cloud

Detailed Solution: Since anyone can access the cloud services of A, it is public, whereas as only employees can access the cloud of B, the latter is a private cloud. Refer Lecture 37.



QUESTION 6:

Which among the following can be considered as a potential service model for cloud computing.

- a. Software as a Service
- b. Database as a Service
- c. Platform as a Service
- d. All of these

Correct Answer: d. All of these

Detailed Solution: All of the given options are well defined cloud service models. Refer Lecture 37 and 38, cloud service models.

QUESTION 7:

Which of the following component can be considered as optional for a sensor node?

- a. Sensing unit
- b. Transceiver
- c. Location finding unit
- d. None of the above

Correct Answer: c. Location finding unit

Detailed Solution: Location finding unit, such as GPS is an optional component for any sensor node.

See lecture 14 @ 08:30

QUESTION 8:

You have bought a spreadsheet processing software in the form of a CD-ROM which you would need to install yourself on your computer to run and then manage. Is it an example of SaaS in cloud computing?

- a. Yes
- b. No

Correct Answer: b. No



Detailed Solution: Cloud computing service models allows you to have access to software over the Internet without the need to install them on your local computer. Refer lecture on cloud computing service models.

QUESTION 9:

Suppose two persons A and B both wish to access a particular SaaS feature from a cloud service provider through their respective personal computers. Both of them log into the cloud at the same time. Then which among the following is true.

- a. Neither A nor B will be able to access the services
- b. A will be able to access the services but not B
- c. B will be able to access the services but not A.
- d. Both A and B will be able to access the services

Correct Answer: d. Both A and B will be able to access the services

Detailed Solution: Cloud services are provided in a many to one manner by the service provider simultaneously. So both will be able to access. Refer Lecture 38@13:50

QUESTION 10:

Along with Accounting, which among the following is an essential component of cloud service management.

- a. Virtualization
- b. Billing
- c. Deployment
- d. None of these

Correct Answer: b. Billing



Detailed Solution: Billing and Accounting are two important cloud service management activities. Refer Lecture 39@5:36

QUESTION 11:

Which among the following security paradigms is concerned with securing the in-transit data between the users and the cloud through the Internet.

- a. Network Level Security
- b. Host Level Security
- c. Application Level Security
- d. None of these.

Correct Answer: a. Network Level Security

Detailed Solution: Network level security is concerned with the security of the in-transit data through the network in cloud computing. Refer Lecture 39@17:10

QUESTION 12:

“Cloud Security ensures that _____ users can access their data after proper _____”

Choose which among the following should be the correct order of words to be filled in the blanks.

- a. legitimate, authentication
- b. illegitimate, authentication
- c. malicious, inaction
- d. malicious, attack



Correct Answer: a. legitimate, authentication

Detailed Solution: Cloud security ensures proper authorization and authentication of only legitimate users. Refer 39 on Cloud security models.

QUESTION 13:

Which among the following should be protected with proper access control in cloud computing

- a. Database access
- b. Server access
- c. Virtual resource access
- d. All of these

Correct Answer: d. All of these

Detailed Solution: Access control should be incorporated in all of the given access points in cloud security. Refer Lecture 39@24:09

QUESTION 14:

Before launching your cloud services as a product to customers, it is always a good idea to test your cloud applications on a cloud simulator first in the pre-deployment phase.

- a. True
- b. False

Correct Answer: a. True



Detailed Solution: Testing your cloud applications on a simulator first in the pre-deployment phase can help you to correct many errors before actually launching them. Refer Lecture 40.

QUESTION 15:

With respect to virtualization in cloud computing, which among the following can be considered as suitable virtualization paradigms.

- a. Storage virtualization
- b. Hardware virtualization
- c. Application virtualization
- d. All of these.

Correct Answer: d. All of these

Detailed Solution: All of the given options can be considered for virtualization in cloud architectures. Refer Chapter 10 of reference book ‘Introduction to IoT’ by Misra et. Al (Cambridge University Press’20)

*****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:

The OpenStack cloud simulation framework provides an interactive Graphical User Interface (GUI)

- a. True
- b. False

Correct Answer: a. True

Detailed Solution: OpenStack provides a very interactive and efficient GUI. Refer Lecture 41 OpenStack demonstrations.

QUESTION 2:

Virtualized resources within the OpenStack simulator that you can define, set parameters of and deploy within OpenStack are also known as

- a. Instances
- b. Files
- c. Hypervisors
- d. Sketches

Correct Answer: a. Instances

Detailed Solution: In OpenStack instances refer to the virtual resources that you define, initialize and deploy. Refer Lecture 41 @ 15:36



QUESTION 3:

If you want to connect your OpenStack instance with the external public network (like the Internet), you would need to connect the following between your instance and the public network

- a. Database
- b. File
- c. Memory
- d. Router

Correct Answer: d. Router

Detailed Solution: Your OpenStack instance is not connected by default to the public network, you would need to initialize a router that makes the connection. Refer Lecture 41@17:37 onwards

QUESTION 4:

Which among the following is NOT a part of a sensor node connected to a wireless sensor network.

- a. Sensing unit
- b. Gaming unit
- c. Processing unit
- d. Communication unit

Correct Answer: b. Gaming unit

Detailed Solution: Each sensor in a WSN is equipped with Sensing unit, Processing unit and Communication unit. Refer Lecture 42@5:29



QUESTION 5:

Consider that you have two types of sensors, soil monitoring sensor for smart farming and temperature sensor for smart industry. The concept that the correct (right) type of sensor must be deployed only at their correct and appropriate physical location suitable as per their functionalities is known as

- a. Right way of deployment
- b. Right place of deployment
- c. Right time of deployment
- d. None of these

Correct Answer: b. Right place of deployment

Detailed Solution: The sensor nodes must always be deployed at their appropriate location. i.e place which is suitable as per their functionalities. Refer Lecture 42 @ 9:53

QUESTION 6:

Sensor-as-a-Service (Se-aaS) is an exciting new concept that brings the service models of cloud computing to traditional IoT sensor networks. In this aspect, which among the following forms an essential component of a Se-aaS architecture.

- a. Sensor marketing
- b. Sensor division
- c. Sensor virtualization
- d. Sensor manufacturing

Correct Answer: c. Sensor virtualization

Detailed Solution: Sensor virtualization is the principal concept behind the architecture and orchestration of Se-aaS. Refer Chapter 10 of reference book 'Introduction to IoT' by Misra et. (Cambridge University Press '20) Al and Refer Lecture 42



QUESTION 7:

Considering the end-to-end architecture of a WSN, from the physical sensor nodes right up to the users, sensor-cloud supports different entities to have ownership of the different layers and components simultaneously.

- a. True
- b. False

Correct Answer: a. True

Detailed Solution: Sensor Cloud supports distributed ownership of different components of the WSN architecture by different entities. Refer Lecture 42@13:19

QUESTION 8:

In sensor cloud architecture the Sensor Cloud Service Provider (SCSP) is logically situated at the following position of the architecture

- a. In the same level as the physical sensors
- b. In between the physical sensors and the user layer
- c. In the same level as the users
- d. None of these

Correct Answer: b. In between the physical sensors and the user layer

Detailed Solution: The SCSP is concerned with providing the cloud based services to the virtual sensor layer, hence it sits in the middle of the physical sensors and the user application layer. Refer Lecture 42 sensor cloud architecture.



QUESTION 9:

In sensor cloud, the association between virtual sensor instances and the corresponding physical sensors follows

- a. one to one mapping
- b. one to many mapping
- c. many to one mapping
- d. many to many mapping

Correct Answer: d. many to many mapping

Detailed Solution: One virtual sensor can be associated with multiple physical sensors, similarly one physical sensor can be associated with many virtual sensors. Hence the mapping is many-many. Refer Lecture 42@6:20 onwards

QUESTION 10:

Dynamic caching mechanism improves the flexibility and efficiency of sensor cloud.

- a. True
- b. False

Correct Answer: a. True

Detailed Solution: Caching can improve in better handling the data movement and user requests in a sensor cloud. Refer Lecture 43 on Dynamic and Adaptive Data Caching mechanism.



QUESTION 11:

With respect to the caching based architecture of a sensor cloud, the External Cache (EC) has a direct data connection with which among the following

- a. The Internal Cache (IC)
- b. The user applications
- c. Physical sensors
- d. Both physical sensors and Internal Cache (IC)

Correct Answer: d. Both physical sensors and Internal Cache (IC)

Detailed Solution: The external cache serves as the intermediate interconnection between the physical sensors below and the Internal Cache (IC) above.

QUESTION 12:

Data from an IoT device is transferred to cloud via a network, which is then processed at the cloud and then a response is sent back to the IoT device from the cloud after processing. The time it takes for one-way data transfer between the node and cloud is 10s and the data processing time at the cloud is 'x' seconds. It takes a total of 25s for the entire to and fro transfer of data between the sensor and cloud along with processing at the cloud. What is the value of x?

- a. 10s
- b. 5s
- c. 15s
- d. 20s

Correct Answer: b. 5s

Detailed Solution: Time taken for one-way data transfer between the node and cloud is 10s. Total time taken for the data transfer is 25s. So $25 = 10 + x + 10$ (transfer from node to cloud+processing at cloud+transfer from cloud to node). Thus $x=5$ s.



QUESTION 13:

There are two types of sensor data, A and B. A is time sensitive that is required to be processed immediately, while B is not time sensitive and can tolerate longer time for processing. As per the standard utilities of cloud and fog computing, which among the following options show the correct processing locations for A and B.

- a. A:Cloud, B: Fog
- b. A: Fog, B: Cloud
- c. None of these
- d. Both of these

Correct Answer: b . A: Fog, B: Cloud

Detailed Solution: Time sensitive data are processed at the fog layer while data that can tolerate processing delay are processed at the cloud layer. Refer Lecture 45, the working of Fog.

QUESTION 14:

There can be multiple fog nodes in between the physical sensor layer at the bottom and the cloud layer at the top.

- a: True
- b. False

Correct Answer: a. True

Detailed Solution: There can be multiple fog nodes in between the cloud layer and the physical sensor nodes for efficient processing. Refer Lecture 45, Architecture of Fog.



QUESTION 15:

Which among the following is/are a potential problem and challenge in fog computing?

- a. Power consumption
- b. Data security
- c. Reliability
- d. All of these

Correct Answer: d. All of these

Detailed Solution: There are several key challenges in fog computing, some of which are the options as given above. Refer challenges of Fog computing in Lecture 45.

*****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:

State whether true or false.

In a smart grid, monitoring and restoration are performed manually.

- a. True
- b. False

Correct Answer: b. False

Detailed Solution: In a traditional electrical grid, monitoring and restoration are performed manually. (Please refer to lecture SMART GRID- I@1:37).

QUESTION 2:

Smart home uses the emerging smart grid technologies to satisfy which of the following?

- a. Save energy
- b. Contribute to the smooth and efficient functioning of the electric grid
- c. Seek out the lowest rate
- d. All of these

Correct Answer: d. All of these

Detailed Solution: Smart home uses the emerging smart grid technologies to save energy, seek out the lowest rate, and contribute to the smooth and efficient functioning of the electric grid (Please refer to lecture SMART GRID- I@27:12).



QUESTION 3:

What is/are the benefit/s of using a smart grid by customers?

- a. Updated information on their energy usage in real-time
- b. Single pricing option
- c. Disabling the smart appliances and smart devices from charging
- d. All of these

Correct Answer: a. Updated information on their energy usage in real-time

Detailed Solution: For customers, the benefit of using a smart grid includes, updated information on their energy usage in real-time, different pricing options, and enabling smart appliances and other smart devices to be charged (Please refer to lecture SMART GRID-I@14:34).

QUESTION 4:

What is the full form of NAN?

- a. Not Area Network
- b. Neighborhood Area Network
- c. National Area Network
- d. None of these

Correct Answer: b. Neighborhood Area Network

Detailed Solution: The full form of NAN is Neighborhood Area Network (Please refer to lecture SMART GRID- II@12:02).

QUESTION 5:

State whether true or false.

In smart grid communication, the gateway acts as a link between the smart meter and the data aggregator unit.

- a. True
- b. False

Correct Answer: a. True

Detailed Solution: In smart grid communication, the gateway acts as a link between the smart meter and the data aggregator unit. (Please refer to lecture SMART GRID- II @ 14:01)



QUESTION 6:

What is/are the vulnerability/vulnerabilities that may exist in the smart grid?

- a. Physical threats
- b. Availability
- c. Dynamic system attacks
- d. All of these

Correct Answer: d. All of these

Detailed Solution: The vulnerability attacks that may exist in the smart grid include physical threats, availability, and dynamic system attacks. (Please refer to lecture SMART GRID- II @ 16:54)

QUESTION 7:

Does the Industrial Internet of things follow the “rip & replace” approach?

- a. Yes
- b. No

Correct Answer: b. No

Detailed Solution: Industrial Internet of things follows the “wrap & re-use” approach. (Please refer to lecture INDUSTRIAL INTERNET OF THINGS- I @ 6:12)



QUESTION 8:

Match the following:

Sensor	Purpose
1. 1 st Industrial revolution	a. Mass production
2. 2 nd Industrial revolution	b. Mechanized production
3. 3 rd Industrial revolution	c. Industrial Internet of Things
4. 4 th Industrial revolution	d. Internet evolution and automation

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

Correct Answer: a. 1-b, 2-a, 3-d, 4-c

Detailed Solution: The industrial evolution of IIoT is as follows.

- 1. 1st Industrial revolution- Mechanized production
- 2. 2nd Industrial revolution- Mass production
- 3. 3rd Industrial revolution- Internet evolution and automation
- 4. 4th Industrial revolution- Industrial Internet of Things

(Please refer to lecture INDUSTRIAL INTERNET OF THINGS- I @ 10:12)



QUESTION 9:

The implanted on-body sensors on a patient's body have led to which of the following facility/facilities?

- a. Better treatment outcome
- b. Reduction in cost
- c. Better accuracy in the collection of data
- d. All of these

Correct Answer: d. All of these

Detailed Solution: Patients can be continuously monitored due to the implanted on-body sensors. This has led to – improved treatment outcomes, the cost has reduced, and improved accuracy in the collection of data. (Please refer to lecture INDUSTRIAL INTERNET OF THINGS- II @ 3:18)

QUESTION 10:

Which of the following is considered the primary challenges of IIoT?

- a. Managing a huge amount of data
- b. Environmental protection
- c. Handling hazardous substances
- d. None of these

Correct Answer: a. Managing a huge amount of data

Detailed Solution: The primary challenges of IIoT includes the management of a huge amount of data. Environmental protection falls under safety challenge and handling hazardous substances is considered a hazard (related) challenge (Please refer to lecture INDUSTRIAL INTERNET OF THINGS- II @ 15:27)

QUESTION 11:

Which of the following is/are provided by the Intelligent Transport System?

- a. Vehicle-to-vehicle connectivity
- b. Vehicle-to-sensor connectivity
- c. Vehicle-to-internet connectivity
- d. All of these

Correct Answer: d. All of these

Detailed Solution: Intelligent Transport System provides vehicle-to-vehicle connectivity, vehicle-to-sensor connectivity, and vehicle-to-internet connectivity. (Please refer to lecture INDUSTRIAL INTERNET OF THINGS- II @ 4:41)



QUESTION 12:

Fill in the blanks.

Structured Query Language is mainly used for managing _____ data in database.

- a. Unstructured
- b. Structured
- c. Audio
- d. All of these

Correct Answer: b. Structured

Detailed Solution: Structured Query Language is mainly used for managing structured data in a database (Please refer to lecture DATA HANDLING AND ANALYTICS- I @9:06).

QUESTION 13:

What is/are the advantage/s of the application of ML on IoT?

- a. Self-learner
- b. Increases human interaction
- c. Not self-guided
- d. All of these

Correct Answer: a. Self-learner

Detailed Solution: Some of the advantages of applying ML in IoT includes self-learner, time-efficient, self-guided, and minimum human interaction requirement (Please refer to book: S. Misra, A. Mukherjee, and A. Roy, 2020. *Introduction to IoT*. Cambridge University Press. Chapter no.-17, page no.-357).

QUESTION 14:

Which of the following represent/s the veracity characteristics of Big data?

- a. Noise
- b. Abnormality
- c. Biases
- d. All of these

Correct Answer: d. All of these

Detailed Solution: Veracity (characteristics of big data) refers to noise, biases, and abnormality in data (Please refer to lecture DATA HANDLING AND ANALYTICS- I @13:50).



QUESTION 15:

State whether true or false.

NoSQL databases can be used for storing unstructured data.

- a. True
- b. False

Correct Answer: a. True

Detailed Solution: Querying languages such as NoSQL are generally used for unstructured data. (Please refer to book: S. Misra, A. Mukherjee, and A. Roy, 2020. *Introduction to IoT*. Cambridge University Press. Chapter no.-6, page no.-117).

*****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:

State whether true or false.

In general, the data collected from an interview can be analyzed through qualitative analysis.

- a. True
- b. False

Correct Answer: a. True

Detailed Solution: In qualitative analysis, the data can be gathered by many methods like interviews, videos, and audios (Please refer lecture Data Handling and Analytics- Part II @ 3:32).

QUESTION 2:

Which of the following are often involved with quantitative analysis?

- a. Analysis of variables
- b. Precision
- c. Data dispersion
- d. All of these

Correct Answer: d. All of these

Detailed Solution: Analysis of variables, Precision, and Data dispersion are often involved with quantitative analysis (Please refer lecture Data Handling and Analytics- Part II @ 4:41).



QUESTION 3:

State whether true or false.

A complete model does not have the same number of variables as the number of equations.

- a. True
- b. False

Correct Answer: b. False

Detailed Solution: A complete model does have the number of variables equal to the number of equations. (Please refer lecture Data Handling and Analytics- Part II @ 8:15)

QUESTION 4:

Which of the following model is mostly applied when it is necessary to compare more than 2 populations or samples?

- a. Analysis of variance
- b. Integration
- c. Trigonometry
- d. All of these

Correct Answer: a. Analysis of variance

Detailed Solution: Analysis of variance is mostly applied when it is necessary to compare more than 2 populations or samples. (Please refer lecture Data Handling and Analytics- Part II @ 9:36)

QUESTION 5:

Fill in the blanks. The effect size for determining statistical significance is the standardized _____ difference between two groups.

- a. Median
- b. Mean
- c. Inter quartile range
- d. None of the above

Correct Answer: b. Mean

Detailed Solution: The effect size is the standardized mean difference between two groups. (Please refer lecture Data Handling and Analytics- Part II @ 17:15)



QUESTION 6:

Which of the following is/are some of the future of the IoT applications in the agriculture?

- a. Soil moisture monitoring
- b. Automation in vermicomposting
- c. Automated weeding system
- d. All of these

Correct Answer: d. All of these

Detailed Solution: Soil moisture monitoring, Automation in vermicomposting, and Automated weeding system are some of the futures of the IoT applications in the agriculture. (Please refer lecture Case study: Agriculture @ 2:15)

QUESTION 7:

Which of the following may be considered as the objective of smart water management using IoT?

- a. Less yield using greater water requirement
- b. Manual irrigation
- c. Not supporting remote monitoring and controlling
- d. None of these

Correct Answer: d. None of these

Detailed Solution: Some of the objectives of smart water management using IoT include more yield using less water, automatic irrigation and remote monitoring and controlling. (Please refer lecture Case study: Agriculture @ 4:35).

QUESTION 8:

State whether true or false.

With the advancement in the sensors and connectivity, it is feasible to enable preventive care along with collecting patient's data.

- a. True
- b. False

Correct Answer: a. True

Detailed Solution: With the advancement in the sensors and connectivity, it is feasible to enable preventive care along with collecting patient's data (Please refer lecture Case study: Healthcare @ 6:30).



QUESTION 9:

Integrated design for remote server in AgriSens includes which of the following?

- a. Web server
- b. Repository data server
- c. Multi users server
- d. All of these

Correct Answer: d. All of these

Detailed Solution: Integrated design for remote server in AgriSens includes Web server, Repository data server and Multi users server (Please refer lecture Case study: Agriculture @ 9:16).

QUESTION 10:

State whether true or false.

The data sensed by the physiological sensors in an IoT-based healthcare system are of no use without proper connectivity and communication.

- a. True
- b. False

Correct Answer: a. True

Detailed Solution: Without proper connectivity and communication, the data sensed by the physiological sensors are of no use in an IoT-based healthcare system. (Please refer book: S. Misra, A. Mukherjee, and A. Roy, 2020. *Introduction to IoT*. Cambridge University Press. Chapter no.-14, page no.-295)



QUESTION 11:

Match the following:

Sensor	Purpose
1. GSR	a. Measures the health of a muscle and a nerve cell
2. EMG	b. Measures the electrical and muscular activity of the heart
3. ECG	c. Measures the intensity of stress on a human
4. SpO2	d. Measures the pulse and oxygen levels in blood

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

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

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

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

Correct Answer: d. 1-c, 2-a, 3-b, 4-d

Detailed Solution: GSR measures the intensity of stress on a human, EMG measures the health of a muscle and a nerve cell, ECG measures the electrical and muscular activity of the heart, SpO2 measures the pulse and oxygen levels in blood. (Please refer book: S. Misra, A. Mukherjee, and A. Roy, 2020. *Introduction to IoT*. Cambridge University Press. Chapter no.-14, page no.-296)



QUESTION 12:

What is/are the risk/s involved in healthcare IoT?

- a. Loss of connectivity
- b. Security (e.g., data tampering and unauthorized access)
- c. Error (e.g., misinterpretation of symptoms)
- d. All of these

Correct Answer: d. All of these

Detailed Solution: The risk involved in healthcare IoT includes loss of connectivity, security and error. (Please refer book: S. Misra, A. Mukherjee, and A. Roy, 2020. *Introduction to IoT*. Cambridge University Press. Chapter no.-14, page no.-300)

QUESTION 13:

State whether true or false.

Activity monitoring, particularly in IoT scenario, plays a vital role for rendering better quality of life and safe guarding humans.

- a. True
- b. False

Correct Answer: a. True

Detailed Solution: Particularly in IoT scenario, activity monitoring plays an important role for rendering better quality of life and safe guarding humans. (Please refer lecture Activity monitoring Case Study - I @ 10:00).



QUESTION 14:

Fill in the blanks.

Processing the sensed data on the device itself is known as _____ approach.

- a. Network based
- b. In-place
- c. Out of the place
- d. None of these

Correct Answer: b. In-place

Detailed Solution: Processing the sensed data on the device itself is known as in-place approach. (Please refer lecture Activity monitoring Case Study - I @ 20:19).

QUESTION 15:

What is/are the different purpose/s that made wearable sensors popular?

- a. Medical
- b. Elderly-care
- c. Child-care
- d. All of these

Correct Answer: d. All of these

Detailed Solution: Wearable sensors have become popular for different purposes which includes Medical, child-care and elderly-care (Please refer lecture Activity monitoring (Case Study - I @ 2:15)).

*****END*****