UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2021

Programme Name: B TECH (CSE+IOT&SC) Semester : 6th
Course Name : Smart Cities Time : 03 hrs
Course Code : CSIS 3009 Max. Marks : 100
Nos. of page(s) : 10
Instructions : Attempt all 12 questions. All questions are compulsory.

SECTION A

		Marks	CO

Q 1	(i) Over _____% of the planet's population now lives in cities. This figure is predicted to rise to more than _____% by the second half of the century, a figure made even more startling by the fact that the human population will have increased by two billion in the same time-frame.
	
	   A. 50 & 70
	   B. 40 % 80
	   C. 30 & 50
	   D. 20 & 40
	
	(ii) A Smart city is an urban area that:
	
	   A. Uses different types of electronic Internet of Things (IoT) sensors to collect data
	   B. Use insights gained from that data to manage assets
	   C. Use insights gained from that data to manage resources and services efficiently
	   D. All Above
	
	(iii) The Smart city concept integrates _____, and various physical devices connected to the IoT network to _____ the efficiency of city operations and services and connect to citizens.
	
	   A. ICT & Optimize
	   B. IT & Optimize
	   C. ICT & Maximize
	   A. B. IT & Maximize
	
	(iv) It has been suggested that a Smart city (also community, business cluster, urban agglomeration or region) uses information technologies to:
	
	   1. Make more efficient use of physical infrastructure (roads, built environment and other physical assets) through artificial intelligence and data analytics to support a strong and healthy economic, social, cultural development.
	   2. Engage effectively with local people in local governance and decision by use of open innovation processes and e-participation, improving the collective intelligence of the city's institutions through e-governance, with emphasis placed on citizen participation and co-design.
	   3. Learn, adapt and innovate and thereby respond more effectively and promptly to changing circumstances by improving the intelligence of the city.
	
	   A. Only 1
		5	CO1

	B. Both 1 & 2 are correct
	C. Both 2 & 3 are correct
	D. All 1, 2 and 3 are correct
	
	(v) Strategies for smart cities should include:
	
	1. Clear communication
	2. A unifying vision through the whole-life cycle.
	3. Integration with policies and governance structure.
	4. Clear holistic understanding of how data is transferred and captured between technologies and systems and how it is used by decision makers.
	
	     A. Both 1 & 3 are correct
	     B. Both 1 & 2 are correct
	     C. Both 2 & 3 are correct
	     D. All 1, 2, 3 and 4 are correct		

Q 2	(i) The smart cities initiative has been launched in how many cities in India. A. 10 B. 100 C. 500 D. 1000 (ii) "Smart Cities Mission" was launched by Prime Minister on: A. 25 June 2016 B. 25 June 2015 C. 25 June 2014 D. 25 June 2017 (iii) The objectives of building automation are: 1. Improved occupant comfort & efficient operation of building systems 2. Reduction in energy consumption and operating costs 3. Improved life cycle of utilities. A. Only 1 and 2 B. Only 2 and 3 C. Only 1 & 3 D. All 1, 2 & 3 (iv) In a Home Automation system, *Controller* acts as: A. The Brain of the System B. The Sensory Organs of the Home C. How the Internal Communication Occurs D. Get Notified Instantly	5	CO1

	(v) In a Home Automation system, *Smart Devices* acts as:
	
	   A. The Brain of the System
	   B. The Sensory Organs of the Home
	   C. How the Internal Communication Occurs
	   D. Get Notified Instantly		

Q 3	(i) Lighting can be turned _____ with a building automation or lighting control system based on time of day, or on occupancy sensor, photosensors and timers.
	
	   A. On
	   B. Off
	   C. Dimmed
	   D. On, Off, or Dimmed
	
	(ii) AHU stands for:
	
	   A. Air High units
	   B. Arithmetic Handling units
	   C. Air Handling units
	   D. Arithmetic High units
	
	(iii) Home automation has which major part(s):
	
	   A. Hardware
	   B. Software/Apps
	   C. Communication protocols
	   D. All Above
	
	(iv) Major IoT platform as a service provider are:
	   A. AWS IoT
	   B. Azure IoT
	   C. Thingworx
	   D. All Above
	
	(v) Famous temperature sensors are:
	
	   A. DHT11/22
	   B. DS18B20
	   C. LM35
	   A. D. All Above
		5	**CO2**

Q 4	(i) What makes smart cities successful?
	
	   A. Pervasive wireless connectivity & Open data
	   B. Security you can trust in
	   C. Flexible monetization schemes
	   D. All above
		5	**CO2**

(ii) Which out of the following is not among the four core security objectives of the Smart Cities:

    A. Availability
    B. Integrity
    C. Confidentiality
    D. Sustainability

(iii) Successful smart cities follow which steps:

    A. Collection & Analysis
    B. Communication & Action
    C. Both A and B
    D. None of the above

(iv) Which out of the above is not an example of major smart cities in the world?

    A. Barcelona, Spain
    B. Tokyo, Japan
    C. Reykjavik, Iceland
    D. Colombo, Srilanka

(v) Basic H/w and S/w requirements for having a Traffic Control using IoT includes which out of the following:

    A. Microcontroller (Arduino Mega 2560 or Arduino Uno)
    B. LEDs
    C. IR Sensor & Jumper Wires
    D. All above

Q 5	(i) Which out of these is not correct about "Smart city lighting system with PLC"
	
	    A. Reduce the light pollution and CO_2 emissions
	    B. Maximize energy utilization
	    C. Wireless platform for smart cities
	    D. Auto diming control system
	
	(ii) Smart meters are preferred over electromechanical or digital meters since these can:
	
	    A. Minimize the chances and number of mistakes
	    B. Maximize the efficiency and performance of the whole system
	    C. Minimize the manpower requirements
	    D. All above
	
	(iii) In the _____, the cumulative number of electricity units was recorded at the end of a month (or more).
	
	    A. Electronic meters
	    B. Electromechanical meters
		5	CO1

C. Both (a) & (b)
D. Smart meters

(iv) Which one is not the advantage of a Smart meter?

    A. Accuracy in meter reading
    B. Data recording
    C. Real time tracking
    D. Manual outage detection

(v) Which out of the following steps is not involved with PLC software development process:

    A. Assembly Language (AL)
    B. Function Block Diagram (FBD)
    C. Sequential Flow Chart (SFC)
    D. Structured Text

Q 6

(i) Different causes of pipeline leak detection is/are:

    A. Fatigue cracks
    B. Stress corrosion
    C. Hydrogen indexing
    D. All above

(ii) Which sensor has all of the following features:

    i.   Water-resistant, fixed case, and connector spread to stop dampness.
    ii.   "One-Touch" Automatic and Manual Calibration.
    iii.   Auto or Manual Temperature Compensation.
    iv.   A large, easy-to-read LCD display.
    v.   Self-Diagnostics alert of issue conditions.
    vi.   Auto power off expand battery life.

    A. PH71/PH72 pH sensor
    B. PH450 sensor
    C. FLXA402 sensor
    D. FU20/FU24/pH20 (all in one) sensor

5   **CO2**

(iii) _____ sensor include four different parameters such as: pH, reference, temperature, and ORP.

    A. PH71/PH72 pH sensor
    B. PH450 sensor
    C. FLXA402 sensor

D. FU20/FU24/pH20 (all in one) sensor

(iv) In which area AMR is mostly used?

    A. Smart city infrastructure
    B. Gas system
    C. Electrical distribution
    D. All the above

(v) Wat is the full form of PLC?

    A. Process Logic Controller
    B. Programmable Logic Controller
    C. Procedural Logic Controller
    D. Procedural Logic control system

SECTION B		

Q 7 (i) Raw data is transmitted in _____ via NFFT in a file, while the location and position of the truck are transmitted from MQTT using the Watson IoT platform.

    A. Internet of Things (IoT)
    B. Internet of Garbage (IoG)
    C. Internet of Wires (IoW)
    D. None of the above

(ii) _____ works in close collaboration with Clean City Network (CCN), which continuously bases container fill-level data through 2G / 3G, media transmission systems.

    A. Clean CAP sensor
    B. Track bin sensor
    C. Ethiopian tech
    D. All above

10   **CO3**

(iii) _____ design relies on the integrated ultrasonic sensor at the top of the waste to detect how close the waste is relative to the casing at the top.

    A. Clean CAP sensor
    B. Track bin sensor
    C. Ethiopian tech
    D. None of the above

(iv) _____ is equipped with ultrasonic sensors, it is capable of monitoring various waste management related parameters.

A. Clean CAP sensor
B. Track bin sensor
C. Ethiopian tech
D. TSwasTe sensor

(v) _____ is a wireless sensor introduced in waste containers or different kinds of containers to calculate the filling rate.

A. Clean CAP sensor
B. Track bin sensor
C. TSwasTe sensor
D. U-Dump M2M

(vi) Following sensor is Suitable for extreme weather, can easily monitor the cloud/mountain/snowpack area and widely used by the meteorologist:

A. Clean CAP sensor
B. Snow Depth Sensor Ush-9
C. Track bin sensor
D. TSwasTe sensor

(vii) Which one is not the advantages of Ice detection:

A. This is a non-contact continuous measurement tool
B. This is suitable for detecting the ice layer as well as freezing rainwater
C. Easily can identify the water and ice
D. Hard installation and very time consuming replaceable with a new system

(viii) What is the first layer of the early warning architecture?

A. Publish
B. Remote transmission
C. Instrument monitoring
D. Data analysis

(ix) What is the detecting distance covered by the IR flame?

A. 20cm
B. 40cm
C. 10cm
D. 1m

	(x) What is the maximum wavelength distance of IR flame? A. 760 nanometres to 1000 nanometres B. 500 nanometres to 700 nanometre C. 400 nanometre to 1000 nanometre D. None of these			
Q 8	(i) Humidity can be controlled by which way(s): A. Dehumidifiers B. Humidifiers C. Both (a) & (b) D. None of the above (ii) Natural gas is fundamentally used as fuel for generating: A. Electricity B. Heat C. Both (a) & (b) D. None of the above (iii) This sensor detect or measure gasses like LPG, Alcohol, propane, Hydrogen, CO and methane A. MQ2 Gas sensor B. MQ3 Gas sensor C. MQ4 Gas sensor D. MQ5 Gas sensor (iv) Air Quality can be measured by which type of sensor: A. MQ135 Gas sensor B. MQ136 Gas sensor C. MQ137 Gas sensor D. MQ138 Gas sensor (v) What is the maximum detection range of MQ-8 sensor? A. 100 PPM B. 500 PPM C. 1000 PPM D. 800 PPM (vi) What are the first layer of the smart data management system? A. Data layer		10	CO4

B. Application layer
C. Service layer
D. Client Layer

(vii) Which gas is measures by MQ-138 sensor?

A. Hydrogen
B. Benzene
C. Ester
D. Both a and c

(viii) The ISC40   inductive conductivitysensor is ideal for determining the
_____ in concentrated acid.

A. percentage concentration
B. mean concentration
C. median concentration
D. None of the above

(ix) NH_3 and Benzene can be detected by which type of sensor:

A. MQ-131
B. MQ-135
C. MQ-136
D. MQ-137

(x) Detection range of MQ-131 sensor for detecting Ozone gas is:

A. 1 ppb to 2 ppm
B. 10 ppb to 2 ppm
C. 10 ppb to 20 ppm
D. 100 ppb to 20 ppm

Q 9	Describe fire detection system and it operation with different sensor? Discuss various types of fire alarm. Compare and contrast Conventional and Smart fire alarm systems. How heat detector work in fire detection system?	10	CO3
Q 10	Give the Work flow of snow monitoring and Technical specification of USH-9. Write four snow level monitoring applications and it's features. Write the advantages of Snow temperature profile sensor.	10	CO4
Q 11	Describe the current scenario of electricity meters. Compare and contrast the traditional electricity grids and smart grids. What advantages of Smart Meters you observe as an IoT engineer? Draw and discuss Traditional AMR architecture and new generation Wi-Fi based AMR architecture. OR Explain an Ice detection system. What are the advantages of an ice detection system?	2	CO4

	SECTION C		
Q 12	Design an IoT based applications for the treatment of **Air Pollution** as a part of Smart City project. Give complete hardware and software specifications along with cost considerations of the project. Specify issues, if any, like legal, ethical etc. How IoT data shall be used to recycle CO_2 emissions? Clearly specify how IoT technology can help where humans struggle. OR Design an IoT based applications for the treatment of **Humidity control** as a part of Smart City project. Give complete hardware and software specifications along with cost considerations of the project. Specify issues, if any, like legal, ethical etc. How IoT data shall be used to recycle CO_2 emissions? Clearly specify how IoT technology can help where humans struggle.	20	CO3