M.TECH/AEIE/1st SEM/AEIE 5102/2018

PROGRAMMING LANGUAGE FOR EMBEDDED IOT SYSTEMS (AEIE 5102)

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and <u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A (Multiple Choice Type Questions)

1. Choose the correct alternative for the following:

 $10 \times 1 = 10$

- (i) What is the CPU clock frequency of the Raspberry Pi 3 model B? (a) 16MHz (b) 1KHz (c) 1GHz (d) 3 GHz.
- (ii) What is the resolution of the ADC in the Raspberry Pi 3 model B?
 (a) 16bit
 (b) 128bit
 - (c) 10bit
 - (d) Raspberry Pi doesn't have an ADC.
- (iii) The BCM2835 of Raspberry Pi is a processor of _____ (a) 8 bit (b) 10 bit (c) 32bit (d) 64 bit.
- >>> s = 'Hello World' (iv) >>> print s[-2:] The following output is seen at console for the above Python code: (a) Hell (b) Hello World (c) ld (d) TypeError: string slicing not allowed. The total number of digital I/O present in the NodeMCU board is? (v) (a) 8 (b) 18 (c) 13 (d) 9. The applications for Android Things are mostly written in? (...;)

(VI)	The applications for Android	I nings are mostly written in
	(a) Objective C	(b) Java
	(c) Kotlin	(d) Both (b) and (c).

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- (vii) MQTT is _____ protocol.
 - (a) Machine to Machine
 - (b) Internet of Things
 - (c) Machine to Machine and Internet of Things (d) Machine Things.
- (viii) Which protocol is lightweight? (a) MQTT (b) HTTP (c) CoAP (d) SPI.
- (ix) What will the Linux command "rm -rf tasks" do?
 (a) Displays list of files in the "tasks" directory
 (b) Deletes the directory named "tasks"
 (c) Creates a new directory named "tasks"
 (d) Deletes all files in the "task" directory.
- (x) What will be the output of the following Python program?
 >>a='Hello' + str(8)
 (a) Hello8
 (b) Hello 8
 (c) Syntax Error
 (d) None of the above.

Group - B

- 2. (a) Explain what do you understand by IaaS cloud service model? Why is XaaS considered the right service model for cloud IoT service providers?
 - (b) What advantage does an IoT based system offer over a conventional wireless sensor network? Explain the various building blocks of an IoT application. (3 + 3) + (4 + 2) = 12
- 3. (a) What is the ITU-T IoT reference model? What differences does this model have with that of the ETSI M2M model?
 - (b) Why is data management a huge part of IoT applications? What role do sensors play in an IoT solution?
 (3 + 3) + (5 + 1) = 12

Group – C

- 4. (a) Explain the basic difference between the MQTT protocol from HTTP. What roles do the read and write API keys play in Thingspeak IoT server?
 - (b) Write a simple python function to accept a string as command line input and print it on the console after omitting the first and last characters of the string.

(4+2)+6=12

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- 5. (a) How different is Android Things from the conventional Android mobile operating system? What are the primary programming languages officially supported by Google for Android Things?
 - (b) What do understand by a Publish/Subscribe request in MQTT protocol? Write a simple Python code to publish a message on the localhost at port 60.

(4+2) + (2+4) = 12

Group – D

- 6. (a) Write a simple Arduino code to print data from a Thingspeak channel on the serial monitor via a ESP8266. Draw necessary circuit diagram.
 - (b) Which version of the ESP WiFi SoC does the NodeMCU use? Write a simple code to blink an LED connected to D7 of the NodeMCU board times a second.
 (3 + 3) + (2 + 4) = 12
- 7. (a) What is the maximum RAM space requirement for MicroPython to run? Write a simple MicroPython code to blink a LED connected to pin 2, times a second.
 - (b) Write a python code to print the last uploaded data on the terminal from Thingspeak IoT server using the http and JASON python modules. (2 + 4) + 6 = 12

Group – E

- 8. (a) Consider a Raspberry Pi 3 running Android Things image, write the onCreate method for MainActivity.java to read the status of an i²c bus connected sensor. Draw necessary circuit diagram.
 - (b) State using an example what role does descriptive analytics play in IoT services?

(4+2)+6=12

- 9. (a) What are the basic similarities that M2M models have with that of IoT solutions? State a few examples where M2M solutions are still used.
 - (b) Write short notes on any two:
 - i. IoT for medical applications
 - ii. IoT verses Wireless sensor networks
 - iii. Data analytics for IoT applications.

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 $(3+3) + (3 \times 2) = 12$