

End Semester Exam

Date: 19 Nov 2022

60

Start Time: 09:00 Hrs

Max. Marks:

Duration: 90 Minutes

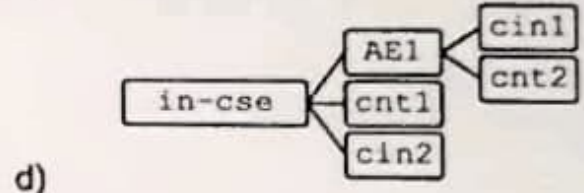
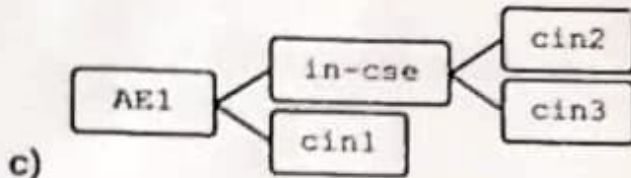
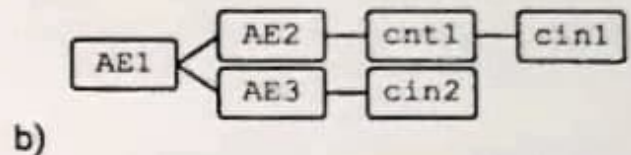
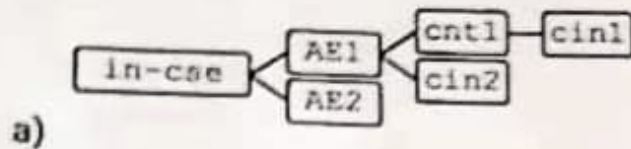
Instructions:

1. This is a closed-book exam.
2. MCQs may have more than a single correct answer (partial marking applicable).
3. There is negative marking of  $-1$  mark for MCQs for **every** wrong answer.
4. There is negative marking of  $-0.5$  mark for True / False questions.
5. Calculators are not allowed.
6. Values in curly brackets (...) are for administrative purposes. Please ignore.

Section I – MCQs

[10 × 2 = 20 M]

1. Which of the following is a correct hierarchy in a typical oneM2M resource tree? {CO-6}



2. Identify the MAC protocols in the given options where packet collisions do not happen. {CO-5}

- a) CSMA/CD      b) CDMA      c) Polling      d) Slotted Aloha

3. Which of the following oneM2M resources and their types are matched correctly? {CO-6}

- a) acp-ty1      b) cnt-ty4      c) cin-ty3      d) sub-ty23

4. Which of the following is a transducer? {CO-4}

- a) Anemometer      b) Battery      c) Antenna      d) None

8. The advantages of using oneM2M as a service layer are: {CO-6}

- a) It is a light-weight middleware standard
- b) It prevents isolation of verticals
- c) The AE layer allows complete interoperability
- d) None of the above

9. CSE in oneM2M stands for: {CO-6}

- a) Common Server Entity
- b) Constrained Service Entity
- c) Common Service Entity
- d) Common Server Endpoint

10. Which of the following are not spread spectrum protocols? {CO-2}

- a) CDMA
- b) FDMA
- c) SDMA
- d) LoRa

## Section II – True / False

[10 × 1 = 10 M]

11. Digital parallel interfaces may operate asynchronously. {CO-3}

12. SPI supports multiple masters but only in half duplex mode. {CO-5}

13. In I2C, the bus drivers can pull a signal line low but cannot drive it high. {CO-2}

14. LEDs work on the principle of electron – hole recombination. {CO-1}

15. The probability of transmission success in Aloha is  $Np(1 - p)^{2(N-1)}$ . {CO-5}

16. CSMA/CA improves on vanilla CSMA by resolving the hidden node problem. {CO-5}

17. GSM works by combining TDD with FDMA and TDMA to allow multiple users in a cell. {CO-7}

18. Zigbee uses IEEE 802.15.4 whereas Wi-SUN uses 802.11 for PHY and MAC layers. {CO-3}

19. Syntactic interoperability helps in understanding a device descriptor. (CO-2)
20. The header "X-M2M-Origin" is mandatory for any request sent to a oneM2M instance. (CO-6)

### Section III – Descriptive Questions

[30 M]

21. Briefly describe the following terminologies. [15 M]
- a) UART [3 M] {CO-5}
  - b) LoRaWAN [3 M] {CO-2}
  - c) IEEE 802.11ah [3 M] {CO-1}
  - d) <AE> resource in oneM2M [3 M] {CO-6}
  - e) <sub> resource in oneM2M [3 M] {CO-7}
22. Write the title of your project and answer the questions below. [15 M]
- a) **Motivation:** Briefly explain the problem statement of your project and the motivation behind it. [3 M] {CO-1}
  - b) **Selection of Components:** Justify your choice of MCU, sensors and actuators, communication protocols used in the final implementation. [3 M] {CO-3}
  - c) **Data Flow and Visualization:** Explain your rationale behind the implemented data flow elaborating the protocols used. Elaborate your dashboard implementation. [3 M] {CO-4, CO-3}
  - d) Complete block diagram of your project implementation with data flows. [6 M] {CO-7, CO-6}