

Professional Certificate of Competency in Advanced TCP/IP-Based Industrial Networking

(CAV)

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| **Student full name:** |  | | | |
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| Please place a tick (☑) in the box below to indicate that you have read, understood, and certify the above statement.  Please include this page in/with your submission.  Any electronic responses to this submission will be sent to your Moodle account.  **AGREEMENT**       **DATE:** | | | | |
|  | | | | |
| Marks (%) | |  | Satisfactory / Not Satisfactory | |
| Assessor: | |  | Date: |  |
| Overall feedback: | |  | | |

**Assessment Instructions:**

1. You must answer ALL questions.
2. Please ensure you complete your answers in a blue font (not red or black).
3. The best marks can be earned by giving concise, brief answers that address the questions.
4. You must reference all content used from other sources including course materials, slides, diagrams, etc. Do not directly copy and paste from course materials or any other resources.   
   Refer to the referencing section of the [EIT eLibrary](https://moodle.eit.edu.au/course/view.php?id=1054) on Moodle for referencing guides.
5. Use this document for completing your answers by typing the answers after each question without deleting the question. Make sure that you preserve the original question number format.
6. Do not add extra pictures, etc. as annexures; instead, paste them directly into this answer sheet. Hand-drawn sketches can be inserted after scanning but please ensure that the file size does not become big (more than 10 MB). You must refer to all diagrams and pictures, etc. that you have drawn or pasted in.
7. When saving your document (must be Word format), ensure you include your name in the title: COURSECODE\_MODULE#\_ASSESSMENTTYPE\_VERSION#\_YOURNAME

**E.g. C##\_M7-12\_Assessment2\_v#\_JohnSmith**

1. Please ensure you complete the Student Declaration on the front page to verify your assessment submission as your own material.

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| **Modules:** | **Modules 7 to 12** |
| **Assessment:** | **Assessment 2** |
| **Version:** | **3.1** |
| **Total marks:** | **150** |

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| --- | --- | --- | --- | --- | --- |
| **PART 1: WRITTEN COMPONENT (117 marks)** | | | | | |
| **Q1** | Compare direct and indirect delivery as mechanisms of routing. | | | **(2 marks)** | |
| **A1** | Student answer | | | | |
| **F1** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q2** | Write short notes on the progression from classful Internet addressing to Classless Inter-Domain Routing (CIDR). | **(5 marks)** | | | |
| **A2** | Student answer | | | | |
| **F2** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q3** | Explain the concept of subnetting. | | | | **(2 marks)** |
| **A3** | Student answer | | | | |
| **F3** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q4** | Provide answers for the following:   1. What is meant by port forwarding? 2. Briefly explain the types of port forwarding. | | **(3 marks)** | | |
| **A4** | Student answer | | | | |
| **F4** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q5** | Briefly explain the three classes of Autonomous Systems (AS's) and their scope of use, i.e. which class is used in what kind of organization. | | | | **(2 marks)** |
| **A5** | Student answer | | | | |
| **F5** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q6** | Briefly describe five different routing metrics. | | | | **(5 marks)** |
| **A6** | Student answer | | | | |
| **F6** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q7** | Explain, in your own words, the basic differences between RIP, OSPF and EIGRP. | | | | **(6 marks)** |
| **A7** | Student answer | | | | |
| **F7** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q8** | Write a brief essay, containing at least ten facts, on Multi-Protocol Label Switching (MPLS). | | **(5 marks)** | | |
| **A8** | Student answer | | | | |
| **F8** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q9** | Describe two differences between analogue and IP CCTV cameras. | | | | **(4 marks)** |
| **A9** | Student answer | | | | |
| **F9** | Assessor feedback: | | | **(marks awarded)** | |
|  | | | | | |
| **Q10** | Briefly discuss any two video compression formats. | | | | **(5 marks)** |
| **A10** | Student answer | | | | |
| **F10** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q11** | Describe the various factors that influence bandwidth requirements in IP CCTV camera systems. You may provide some rough guidelines as well. | | | | **(5 marks)** |
| **A11** | Student answer | | | | |
| **F11** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q12** | Provide answers for the following:   1. Draw (don’t copy/paste from a textbook) a neat diagram of the OSI layers present in MODBUS Serial and explain what limitations are imposed by the lowest layer. 2. Which two modes of operation are defined for MODBUS Serial and why may the one be chosen over the other? | | | | **(5 marks)** |
| **A12** | Student answer | | | | |
| **F12** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q13** | Provide answers for the following:   1. Draw (don’t copy and paste from a textbook) a neat diagram showing the OSI layers present in MODBUS/TCP. (1 mark) 2. Describe the MODBUS/TCP modifications to the MODBUS Serial ADU. (4 marks) | | | | **(5 marks)** |
| **A13** | Student answer | | | | |
| **F13** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q14** | List two disadvantages of OPC. | | | | **(2 marks)** |
| **A14** | Student answer | | | | |
| **F14** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q15** | Provide answers for the following:   1. Draw (don’t copy/paste from a textbook) the frame structure of Ethernet PowerLink. (1 mark) 2. Explain what EPL is used for. (1 mark) 3. Describe the basic operation of EPL. (3 marks) | **(5 marks)** | | | |
| **A15** | Student answer | | | | |
| **F15** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q16** | Provide answers for the following:   1. What are Access Control Lists (ACLs) as used in routers? (1 mark) 2. On what basis is traffic permitted or denied via ACLs? (1 mark) | | **(2 marks)** | | |
| **A16** | Student answer | | | | |
| **F16** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q17** | Provide answers for the following:   1. Which filtering technique is used for selectively enabling and disabling TCP ports? (1 mark) 2. Explain its operation. (2 marks) | | **(3 marks)** | | |
| **A17** | Student answer | | | | |
| **F17** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q18** | Describe the basic operation of Stateful Firewalls. | | | | **(2 marks)** |
| **A18** | Student answer | | | | |
| **F18** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q19** | Name two IP security framework (IPSec) protocols. | | **(2 marks)** | | |
| **A19** | Student answer | | | | |
| **F19** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q20** | Discuss any one of the wireless security protocols used in IEEE 802.11. | | **(5 marks)** | | |
| **A20** | Student answer | | | | |
| **F20** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q21** | Briefly discuss hardware-based versus software-based firewalls with an advantage/disadvantage of each. | | | | **(2 marks)** |
| **A21** | Student answer | | | | |
| **F21** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q22** | List two applications of wireless Ethernet backhauls. | | | | **(2 marks)** |
| **A22** | Student answer | | | | |
| **F22** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q23** | Mention four technologies used by Ethernet modems for PtP and PtMP applications. | | | | **(2 marks)** |
| **A23** | Student answer | | | | |
| **F23** | Assessor feedback: | | | **(marks awarded)** | |
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| **Q24** | List four vendors of industrial Mesh networks. | | **(2 marks)** | | |
| **A24** | Student answer | | | | |
| **F24** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q25** | Provide answers for the following:   1. What was the problem with the original version of WEP? (2 marks) 2. What is the difference between WPA and WPA2? (2 marks) 3. What does WPA2 use for (i) authentication and (ii) encryption? (2 marks) | | | | **(6 marks)** |
| **A25** | Student answer | | | | |
| **F25** | Assessor feedback: | | | **(marks awarded)** | |
|  | | | | | |
| **Q26** | Write a note on BGP-4. | | | | **(2 marks)** |
| **A26** | Student answer | | | | |
| **F26** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q27** | Classify and briefly describe three types of VPN. | | | | **(4 marks)** |
| **A27** | Student answer | | | | |
| **F27** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q28** | What are the main responsibilities of an Application layer Firewall? | | | | **(2 marks)** |
| **A28** | Student answer | | | | |
| **F28** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q29** | Write brief notes on:   1. Bluetooth modems 2. IEEE802.11 modems 3. Proprietary technology modems, and 4. Wireless I/O extenders | | | | **(4 marks)** |
| **A29** | Student answer | | | | |
| **F29** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q30** | List any two issues that could be addressed in a security policy. | **(2 marks)** | | | |
| **A30** | Student answer | | | | |
| **F30** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q31** | What do you understand by the term Denial-of-Service attack? Give two examples. | | **(2 marks)** | | |
| **A31** | Student answer | | | | |
| **F31** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q32** | Mention four ‘targets’ that could be affected by DoS attacks. | | **(2 marks)** | | |
| **A32** | Student answer | | | | |
| **F32** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q33** | How does one-to-one NAT operate? | | | | **(2 marks)** |
| **A33** | Student answer | | | | |
| **F33** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q34** | Provide answers for the following:   1. What does LAN stand for? (1 mark) 2. What is the function of a LAN? (1 mark) 3. List two EAP methods. (1 mark) | | **(3 marks)** | | |
| **A34** | Student answer | | | | |
| **F34** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q35** | Provide answers for the following:   1. What is SSH? (2 marks) 2. What is an IBSS? (1 mark) | | **(3 marks)** | | |
| **A35** | Student answer | | | | |
| **F35** | Assessor feedback: | | | **(marks awarded)** | |
|  |  | | | | |
| **Q36** | What is the relationship between PPP, EAP and IEEE802.1X? | | | | **(2 marks)** |
| **A36** | Student answer | | | | |
| **F36** | Assessor feedback: | | | **(marks awarded)** | |

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| **PART 2: PRACTICAL COMPONENT (33 marks)**  The exercise, software and other documentation referred to has been uploaded to Moodle. Also see instructions for accessing the Remote Lab facility. Please contact your instructor if you experience any difficulties. | | | | |
| **Q37** | Routing  Work through Exercise 97 - Industrial Router (download from Moodle) and paste your results here. Also see the user manual for the router. Note that in some cases you are required to deviate from the IP addresses and ports shown in Exercise 97.   1. Snag the IP configuration (see 3.2 in exercise). (3 marks) 2. Set up a static route (see 3.3) so that packets destined for network 200.200.200.0/24 are forwarded to 192.168.2.11/24 and snag the configuration screen. (3 marks) 3. Set up Masquerading (see 3.5a) so that packets from 192.168.3.0/24 will be forwarded under the guise of 163.8.8.0/24. Assume that the other port of the router is set to 163.8.8.0/24, although in reality it is not the case. Snag the configuration screen. (3 marks) 4. Set up Port Forwarding (3.5d) so that FTP connection requests to 192.168.3.100 will be forwarded to 192.168.2.11. Snag the configuration screen. (3 marks)   Perform a ‘classful’ subnet calculation with the Solarwinds subnet calculator (download from Moodle). Divide 192.168.7.0/24 into 4 subnets.   1. What is the new subnet mask? (1 mark) 2. Click the ‘generate subnets’ button and snag the result. (1 mark) 3. How many ‘usable’ IP addresses do we lose because of subnetting in this example? (1 mark) | | | **(15 marks)** |
| **A37** | Student answer | | | |
| **F37** | Assessor feedback: | | **(marks awarded)** | |
|  |  | | | |
| **Q38** | Ethernet in Industrial Automation  Work through Exercise 1 (Kepware OPC Server) and snag the result. | | | **(3 marks)** |
| **A38** | Student answer | | | |
| **F38** | Assessor feedback: | | **(marks awarded)** | |
|  | | | | |
| **Q39** | Wireless  Find a typical 900 MHz Industrial Ethernet modem and provide:   1. The manufacturer’s name. 2. The model name. 3. A snag of the device (paste it below). | **(5 marks)** | | |
| **A39** | Student answer | | | |
| **F39** | Assessor feedback: | | **(marks awarded)** | |
|  |  | | | |
| **Q40** | Wireless  This question is based on the Moxa AWK-3131 as per Exercise 18.  Remember not to save any settings.  Work through the exercise until you get to 3.3.1.   1. Set the mode to Bridge (Master) and snag the Operation Mode screen. (2 marks) 2. Proceed to 3.3.2.a and: 3. Set the RF type to B/G mixed 4. Select channel 1 5. Change the SSID to your first name or family name, whatever the easiest 6. Disable SSID broadcast.   Snag the Basic Wireless Settings screen. (4 marks)   1. Proceed to 3.3.2.b, select WPA2, and snag the WLAN Security Settings screen after setting to Enterprise Mode with one RADIUS server only, at 192.168.1.100. Any passphrase will do, as the characters are shown as dots.   Paste snag here (4 marks) | | | **(10 marks)** |
| **A40** | Student answer | | | |
| **F40** | Assessor feedback: | | **(marks awarded)** | |

**END OF ASSESSMENT**