

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

(CAV)

**MODEL ANSWERS**

**DO NOT GIVE TO STUDENTS**

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| **Modules** | Modules 7 to 12 | | |
| **Assessment type** | Assessment 2 | | |
| **Version** | 3.1 | | |
| **Created by** | EIT | **Date** | 01 February 2021 |
| **Reviewed by** |  | **Date** |  |

Guidelines for Assessors

Students will submit completed assessment tasks via Moodle on or before the submission due date. Some students may have extension requirements which will be noted on Moodle.

As the **assessor**, you are required to assess student submissions and ensure assessments follow the ‘Principles of Assessment’ as well as the ‘Rules of Evidence’. You need to ensure student performance is in line with the relevant assessment criteria, the unit outline, this marking guide/model answers and the Training and Assessment Matrix (TAM).

Assessors are given three weeks to finalise and upload all marking and feedback to Moodle. During the course of the assessment, the assessor may seek clarification from the instructor (if required).

Please refer to Appendix B (Assessor Guide) of the Instructor and Assessor Contract for full details.

1. Students must answer ALL questions. If any questions are not answered the assessor will need to ask the student to resubmit the assessment as their second attempt.
2. All answers must be in the students own words. They 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.
3. Copying and pasting is not allowed. The main idea behind written assessments is for the student to learn and understand the material by reading it and answering the questions as stated. Cutting and pasting from internet sites or the resource material does not enhance that learning process. However, appropriate diagrams can be pasted if a student cannot draw them.
4. Students are advised that the best result can be earned by giving concise, brief answers that address the questions as stated.
5. Students must use the Microsoft Word question document for completing their answers by typing the answers after each question without deleting the question. They are asked to make sure that they preserve the original question number format and that they don’t change the question numbers by adding extra lines or deleting existing ones.
6. Students are advised not to add extra pictures, etc. as annexures but add the pictures and diagrams directly into the main answer document by pasting. Hand-drawn sketches can be inserted after scanning but students are asked to ensure that the assessment file size does not become too large (more than 10 MB).
7. Students must refer to all diagrams and pictures, etc. that they have drawn or pasted in. They should not paste them into the document without referring to them in the written answer.
8. If an assessor suspects plagiarism in any student submissions they must report this to the Learning Support Officer immediately.

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| **Modules:** | **Modules 7 to 12** |
| **Assessment type:** | **Assessment 2** |
| **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** | Model answer: | |
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| **Q2** | Write short notes on the progression from classful Internet addressing to Classless Inter-Domain Routing (CIDR). | **(5 marks)** |
| **A2** | Model answer: | |
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| **Q3** | Explain the concept of subnetting. | **(2 marks)** |
| **A3** | Model answer: | |
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| **Q4** | Provide answers for the following:   1. What is meant by port forwarding? 2. Briefly explain the types of port forwarding. | **(3 marks)** |
| **A4** | Model answer: | |
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| **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** | Model answer: | |
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| **Q6** | Briefly describe five different routing metrics. . | **(5 marks)** |
| **A6** | Model answer: | |
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| **Q7** | Explain, in your own words, the basic differences between RIP, OSPF and EIGRP. | **(6 marks)** |
| **A7** | Model answer: | |
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| **Q8** | Write a brief essay, containing at least ten facts, on Multi-Protocol Label Switching (MPLS). | **(5 marks)** |
| **A8** | Model answer: | |
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| **Q9** | Describe two differences between analogue and IP CCTV cameras. | **(4 marks)** |
| **A9** | Model answer: | |
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| **Q10** | Briefly discuss any two video compression formats. | **(5 marks)** |
| **A10** | Model answer: | |
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| **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** | Model answer: | |
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| **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** | Model answer: | |
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| **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** | Model answer: | |
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| **Q14** | List two disadvantages of OPC. | **(2 marks)** |
| **A14** | Model answer: | |
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| **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** | Model answer: | |
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| **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** | Model answer: | |
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| **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** | Model answer: | |
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| **Q18** | Describe the basic operation of Stateful Firewalls. | **(2 marks)** |
| **A18** | Model answer: | |
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| **Q19** | Name two IP security framework (IPSec) protocols. | **(2 marks)** |
| **A19** | Model answer: | |
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| **Q20** | Discuss any one of the wireless security protocols used in IEEE 802.11. | **(5 marks)** |
| **A20** | Model answer: | |
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| **Q21** | Briefly discuss hardware-based versus software-based firewalls with an advantage/disadvantage of each. | **(2 marks)** |
| **A21** | Model answer: | |
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| **Q22** | List two applications of wireless Ethernet backhauls. | **(2 marks)** |
| **A22** | Model answer: | |
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| **Q23** | Mention four technologies used by Ethernet modems for PtP and PtMP applications. | **(2 marks)** |
| **A23** | Model answer: | |
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| **Q24** | List four vendors of industrial Mesh networks. | **(2 marks)** |
| **A24** | Model answer: | |
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| **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** | Model answer: | |
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| **Q26** | Write a note on BGP-4. | **(2 marks)** |
| **A26** | Model answer: | |
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| **Q27** | Classify and briefly describe three types of VPN. | **(4 marks)** |
| **A27** | Model answer: | |
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| **Q28** | What are the main responsibilities of an Application layer Firewall? | **(2 marks)** |
| **A28** | Model answer: | |
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| **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** | Model answer: | |
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| **Q30** | List any two issues that could be addressed in a security policy. | **(2 marks)** |
| **A30** | Model answer: | |
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| **Q31** | What do you understand by the term Denial-of-Service attack? Give two examples. | **(2 marks)** |
| **A31** | Model answer: | |
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| **Q32** | Mention four ‘targets’ that could be affected by DoS attacks. | **(2 marks)** |
| **A32** | Model answer: | |
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| **Q33** | How does one-to-one NAT operate? | **(2 marks)** |
| **A33** | Model answer: | |
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| **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** | Model answer: | |
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| **Q35** | Provide answers for the following:   1. What is SSH? (2 marks) 2. What is an IBSS? (1 mark) | **(3 marks)** |
| **A35** | Model answer: | |
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| **Q36** | What is the relationship between PPP, EAP and IEEE802.1X? | **(2 marks)** |
| **A36** | Model answer: | |

**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.

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| **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** | Model answer: | |
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| **Q38** | Ethernet in Industrial Automation  Work through Exercise 1 (Kepware OPC Server) and snag the result. | **(3 marks)** |
| **A38** | Model answer: | |
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| **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** | Model answer: | |
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| **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** | Model answer: | |

**END OF ASSESSMENT**