

# INSTITUTE OF TECHNOLOGY

## BLANCHARDSTOWN

<b>Year</b>	Year 3
<b>Semester</b>	Semester 1
<b>Date of Examination</b>	
<b>Time of Examination</b>	

<b>Prog Code</b>	BN013	<b>Prog Title</b>	Bachelor of Science in Computing in Information Technology	<b>Module Code</b>	COMP H3021
<b>Prog Code</b>	BN302	<b>Prog Title</b>	Bachelor of Science in Computing in Information Technology	<b>Module Code</b>	COMP H3021
<b>Prog Code</b>	BN104	<b>Prog Title</b>	Bachelor of Science (Honours) in Computing	<b>Module Code</b>	COMP H3021

<b>Module Title</b>	Advanced Switching and Routing
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**Internal Examiner(s):**  
**External Examiner(s):**

**Michael O'Donnell**  
**Dr. Richard Studdert,**  
**Mr. John Dunnion**

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### Instructions to candidates:

- 1) Attempt **ALL PARTS** of Question 1 and any **TWO** other questions
- 2) Question 1 is worth 40 marks and all other questions are worth 30 marks each.

**DO NOT TURN OVER THIS PAGE UNTIL YOU ARE TOLD TO DO SO**

### **Question 1 (Mandatory)**

- (a) Outline, with the aid of a diagram, the main components of a large campus network, using the hierarchical design model.

**(8 marks)**

- (b) Give an overview of the Cisco Express Forwarding (CEF) technology as used in Multilayer switches.

**(8 marks)**

- (c) Describe, with the aid of a diagram, the operation of the Hot Standby Router Protocol (HSRP).

**(8 marks)**

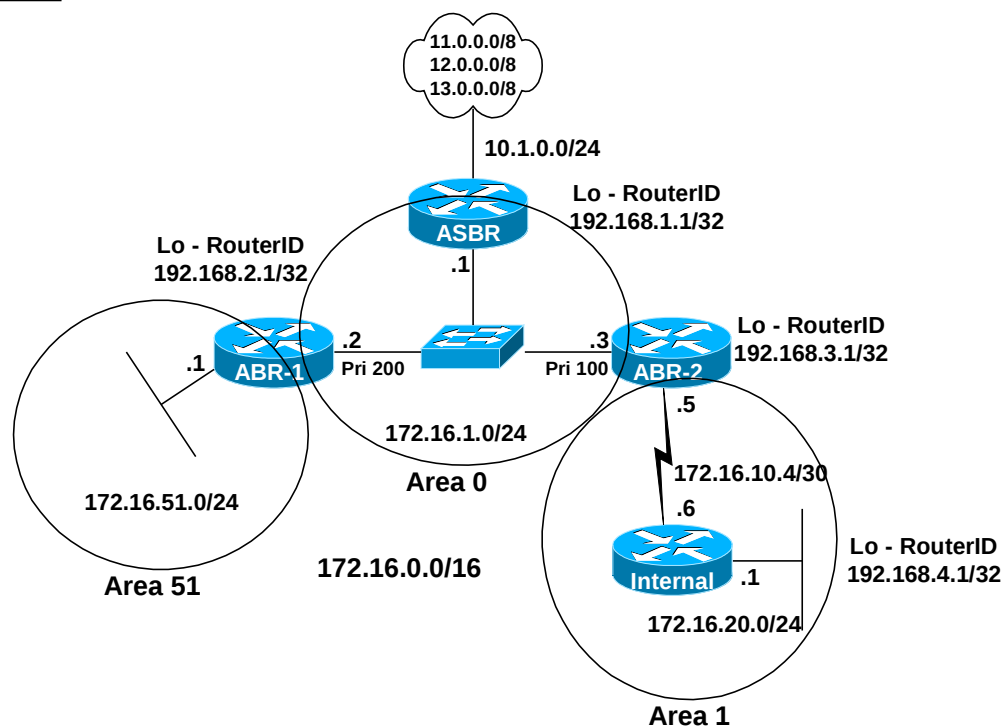
- (d) PortFast and UplinkFast are **two** strategies used by the Spanning Tree Protocol (STP) to accelerate the speed of convergence of a network topology. Outline the operation of both of them.

**(8 marks)**

- (e) Describe the operation of each of the following area types in an OSPF Multi-Area network: **Backbone Area, Stub Area, and Totally Stubby Area**. Illustrate your answer with a diagram.

**(8 marks)**

## Question 2



Refer to the diagram above to answer the following questions:

- The **show ip ospf database** command is issued on the **Internal** router. Complete the table for LSA 1 – Router Link States by listing the Link ID and ADV Routers in the resulting output. (4 marks)
- Repeat part (a) above but this time give the resulting output for the **ABR-2** router. (2 marks)
- On which router or routers would you expect an output for LSA 2 – Network Link States after issuing the command **show ip ospf database**. (4 marks)
- The **show ip ospf database** command is issued on the **ASBR** router. Complete the table for LSA 3 – Summary Net Link States by listing the Link ID and ADV Routers in the resulting output. (4 marks)

Question 2 continued on next page

## **Question 2 continued from previous page**

- (e) The **show ip ospf database** command is issued on the **ABR-2** router. Complete the table for LSA 4 – ASBR Summary Link States by listing the Link ID and ADV Routers in the resulting output.  
(4 marks)
- (f) The **show ip ospf database** command is issued on the **ABR-2** router. Complete the table for LSA 5 – AS External Link States by listing the Link ID and ADV Routers in the resulting output.  
(4 marks)
- (g) Describe the effect of making Area 1 a Stub Area.  
(4 marks)
- (h) In what type of situation could Area 1 be made into a Not So Stubby Area (NSSA)?  
(4 marks)

## **Question 3**

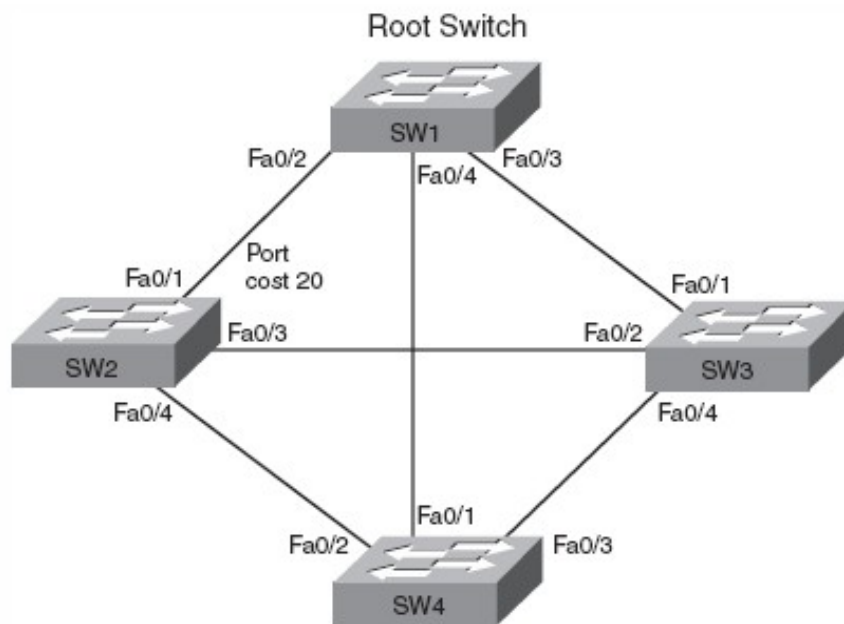
- (a) Outline the situations where it is recommended to use the Border Gateway Protocol (BGP) within an Autonomous System.  
(6 marks)
- (b) Describe the **four** message types that are used in the configuration of BGP.  
(12 marks)
- (c) Outline the **twelve-step** process by which BGP uses attribute values in choosing the best route when faced with multiple routes to the same destination.  
(12 marks)

#### Question 4

- (a) The diagram below shows four switches linked together to form redundancy. SW1 has been elected as the Root Switch. SW2's Fa0/1 interface uses a cost of 20, with all other interfaces using the default STP cost of 19.

The corresponding Bridge IDs for each switch is given in the table below:

Switch	BID
SW2	30000, 0200.2222.2222
SW3	32768, 0200.3333.3333
SW4	32768, 0200.4444.4444



Label the correct designation of each port in the diagram above, i.e. if it is a Designated or Blocking port.

**(12 marks)**

- (b) Describe briefly the 5 states that STP undergoes before achieving convergence.

**(10 marks)**

- (c) Describe the main characteristics of PVST+ and how it provides Layer 2 load balancing.

**(8 marks)**