



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS**  
**DEPARTMENT OF COMPUTER SCIENCE & SOFTWARE ENGINEERING**  
**UNIVERSITY EXAMINATION FOR THE DEGREE OF MASTERS OF IT SECURITY**  
**& AUDIT**  
**1<sup>ST</sup> YEAR 2<sup>ND</sup> SEMESTER 2016/2017 ACADEMIC YEAR**  
**KISUMU LEARNING CENTER**

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**COURSE CODE: IIT 5113**

**COURSE TITLE: TCP/IP ARCHITECTURE & ENTERPRISE**

**EXAM VENUE:**

**STREAM: IT SECURITY & AUDIT**

**DATE:**

**EXAM SESSION:**

**TIME: 3 HOURS**

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**INSTRUCTIONS**

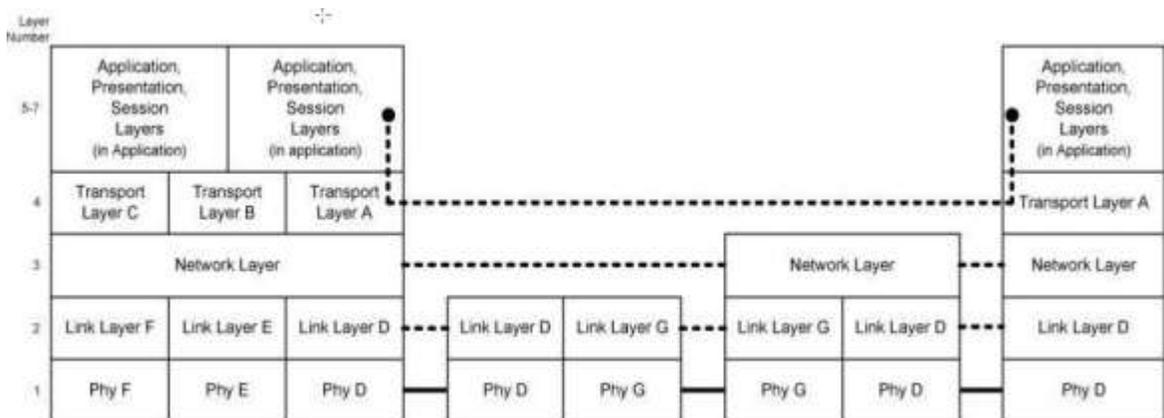
- 1. Answer ANY THREE questions**
- 2. Candidates are advised not to write on the question paper**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room**

**Question 1 [20 marks]**

- a) Each IP address has 65,536 associated port numbers for each transport protocol that uses port numbers (most do), and they are used for determining the correct receiving application. Briefly identify *any five* common port numbers and corresponding applications associated with these ports **(5 marks)**
- b) Discuss three types of IP addresses in reference to forwarding of packets. **(3 marks)**
- c) Using a diagram discuss the TCP/IP protocol stack. Identify the functions, protocols or applications in each layer. **(12 marks)**

**Question 2 [20 marks]**

- a) Using a diagram briefly discuss the following terms:
  - i) TCP Flow control **(4 marks)**
  - ii) TCP Error control **(4 marks)**
  - iii) TCP Congestion control **(4 marks)**
- b) Although TCP and UDP are found in the same layer, they differ considerably in the way they function. State at least two differences on how the two work. **(2 marks)**
- c) The diagram below represents a somewhat idealized small internet showing two end systems, and two devices. In this diagram, each number corresponds to a type of protocol at a particular layer. As we can see, each device implements a different subset of the layer stack. **(6 marks)**
  - i) Identify the two devices.
  - ii) Briefly explain how the two devices implement different layer protocols.



**Question 3 [20 marks]**

- a) Identify two ways TCP sender can detect lost packets. Briefly explain how TCP responds when packet loss is caused by congestion? **(10 marks)**
- b) Using a diagram briefly discuss the differences between IPv4 header and IPv6 headers. **(10 marks)**

**Question 4 [20 marks]**

- a) The network engineer gives you the following network address and subnet mask: 192.168.1.0/27 **(6 marks)**
  - i) Determine the number of subnets that can be created from this network address (show your work)
  - ii) Calculate the number of assignable IP addresses for each subnet created (show your work).
- b) Using a diagram differentiate between the following three common ARQ retransmission schemes: Stop-and-Wait ARQ , Go-Back-N ARQ, and Selective Repeat ARQ **(9 marks)**
- c) You are provided with a url address as shown below. Describe this url in terms of the port number, TCP/IP protocols and applications involved. [http://\[2001:0db8:85a3:08d3:1319:8a2e:0370:7344\]:443/](http://[2001:0db8:85a3:08d3:1319:8a2e:0370:7344]:443/). Identify the number of bits and the version of IP address. . **(5 marks)**

**Question 5 [20 marks].**

- a) Briefly discuss security vulnerability issues associated with the following: **(12 marks)**
  - i) TCP Error control
  - ii) TCP Congestion control
  - iii) TCP Flow control
- b) Understanding Layer 3 protocols and services is critical to troubleshooting many issues. Briefly discuss common Layer 3 issues. **(3 marks)**
- c) You have been appointed to act as the network admin for JOOUST. Troubleshooting network issues is one of the responsibilities of the network administrator. This is typically in response to a problem report in the form of a trouble ticket. The system has generated a ticket for a problem experienced by the lecturer using the JOOUST e-learning platform. The basic model of troubleshooting may follow the structured troubleshooting approach which articulates 7 steps in troubleshooting. Identify any five of the 7 stages you would follow to solve the problem. **(5 marks)**