

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCES
COMPUTER SCIENCE DEPARTMENT
MAY EXAMINATIONS 2011

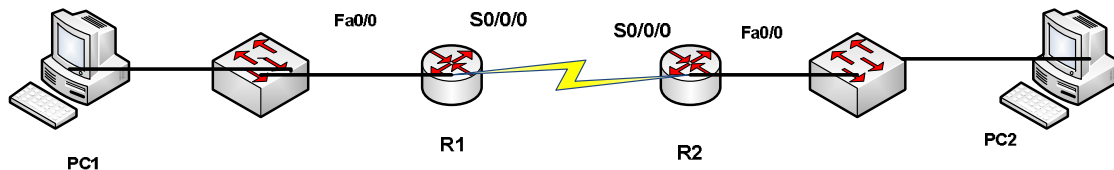
SUBJECT: COMPUTER APPLICATION AND NETWORKS
CODE: SCS 4202

Instructions to candidate:

1. Answer any four questions. Paper contains five questions.
2. All questions to be answered with respect to Computer Applications and Networks.
3. Strictly No Calculators are to be used.

3 Hours

QUESTION ONE



You have been given the address space 192.168.1.0/24 to use in the above network design. The network consists of the following segments

- The network connected to router R1 will require enough IP addresses to support 15 hosts.
- The network connected to router R2 will require enough IP addresses to support 30 hosts.
- The link between router R1 and router R2 will require IP addresses at each end of the link.

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0			n/a
R1	S0/0/0			n/a
R2	Fa0/0			n/a
R2	S0/0/0			n/a
PC1	NIC			
PC2	NIC			

Table 1

Design a full addressing scheme to meet these requirements including those of Table 1. [25]

QUESTION TWO

An army barracks has been allocated a network address 172.16.15.6/24. The IT section of the army decides for security reasons they have to divide the complete network to 250 separate networks nationwide, each network having 1500 hosts. Develop an appropriate networking scheme using the legacy method. [25]

QUESTION THREE

- a) The Data Link layer of the OSI Reference model is split into two sub layers what are these sub layers and what purpose do they serve? [8]
- b) What is the typical information contained in a frame header? [8]
- c) Generally when data needs to be delivered to a different network segment a router is involved. Why does the router change the type of frame for external delivery? [5]
- d) What addressing scheme is employed in PPP point-to-point topologies and why? [4]

QUESTION FOUR

- a) Shared media can be Deterministic or non-Deterministic. Compare the two in terms of advantages and disadvantages. [6]
- b) If during a communication transmission using shared media VOIP and email packets are multiplexed. If congestion occurs which frames are dropped and why? [4]
- c) Describe in detail the operation of the "3 – Way Handshake " [10]
- d) What technique is used to secure packets? [5]

QUESTION FIVE

- a) Suppose that a datagram network has a routing algorithm that generates routing tables so that there are two disjoint paths between every source and destination that is attached to the network. What problems are introduced with this approach? [5]
- b) Random Early Detection (RED) is a buffer management mechanism that is intended to avoid congestion in a router by keeping average queue length small. The RED algorithm continuously compares a short time average queue length with two thresholds min_{th} and max_{th} . When the average queue length is below min_{th} RED does not drop any packets. When the average queue length is between min_{th} and max_{th} RED drops an arriving packet with a certain probability that is an increasing function of the average queue length. The random packet drop is used to notify the sending TCP to reduce its rate before the queue becomes full. When the average queue length exceeds max_{th} RED drops each arriving packet.

- i) What impact does RED have on the tendency of TCP receivers to synchronize during congestion. [5]
- ii) What is the effect of RED on network, throughput, goodput and bandwidth? [5]
- iii) Discuss the fairness of the RED algorithm with respect to flows that respond to packet drops and non-adaptive flows like UDP. [5]
- iv) Discuss the implementation complexity of the RED algorithm. [5]

END OF QUESTION PAPER

