

**Uva Wellassa University of Sri Lanka**  
**Faculty of Science and Technology**  
**Department of Computer Science and Technology**  
**200 level 1<sup>st</sup> Semester Examination – Jan. / Feb. 2016**  
**CST 241-3 / SCT 377-3 Data Communication and Networking**



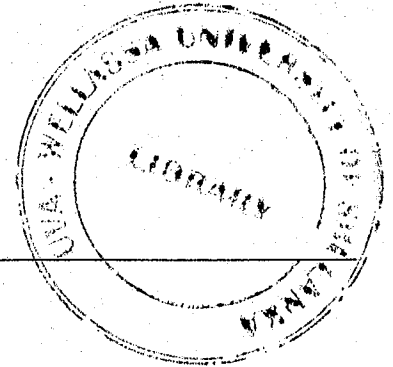
**Instructions to candidates**

**Duration:** Three (03) hours

**Number of questions:** Six (06)

**Answer all Questions**

**Mark allocation:** 100



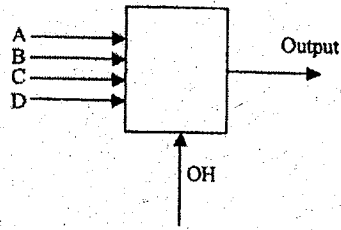
1.
  - a. Discuss the responsibilities of each layer of the ISO-OSI Seven Layer Model.
  - b. Differentiate Segment and Frame with the aid of diagrams.
  - c. Describe private and public address classes, IP address ranges associated and the appropriate subnet masks.
  - d. Briefly explain the four (04) physical layer characteristics with examples

(15 mark)
  
2.
  - a. Compare and contrast Forward and Backward Error Correction using diagrams.
  - b. Illustrate Automatic Repeat request (ARQ) error correction method with suitable examples.
  - c. What is meant by clock recovery in data transmission?
  - d. Draw the line codes RZ, NRZ for the following bit pattern  
0110001110101

(15 mark)
  
3. Use the network address given below to answer the following questions.  
Address – 192.168.20.0/24
  - a. What is the network address and the class indicated above ?
  - b. Illustrate the network and host portion of the address indicated above.
  - c. Indicate that first usable IP address range.
  - d. What is the broadcast IP address of the first usable IP address range.
  - e. Make four (04) subnets from above IP address.

(15 mark)
  
4.
  - a. Explain in detail with diagrams how the analog signals are being converted into digital signals.
  - b. Illustrate with diagrams how amplitude modulation (AM) differs from frequency modulation (FM).
  - c. Explain in detail about multiplexing and how it works.

- d. If four (4) input channels (each channel's data rate is 250bps) are multiplexed and there is one overhead channel (45 bps) as follows, calculate the output bit rate.



(20 mark)

5.

- Why wireless networking is important in LANs?
- Name two (02) frequency ranges available for Wireless Local Area Networks (WLANs)
- Write brief notes on the following transmission media including the noise, attenuation and interference features.
  - Copper cables
  - Fiber optics
  - Radio transmission
- Draw a diagram and explain the light propagation principle in fiber optics.

(15 mark)

6.

- What is multiplexing?
- Consider the following bit pattern for the digital modulation.  
1 0 0 0 1 0 0 1 1 1 1 1
  - FSK
  - ASK
  - BPSK
  - QPSK
- Explain what is meant by signal to noise ratio (S/N)?
- Describe how SNR affects to the signal quality.
- Automatic Repeat reQuest (ARQ) is an example for Backward Error Correction. Draw the timing diagrams for the followings,
  - Send 5 frames and 2<sup>nd</sup> frame has errors. - use Idle ARQ
  - Send 6 frames and 3<sup>rd</sup> frame has errors - use Selective ARQ
  - Send 6 frames and 4<sup>th</sup> frame has errors – use Go-Back-N ARQ

(20 mark)