BINDURA UNIVERSITY OF SCIENCE EDUCATION

PHYSICS AND ENGINEERING DEPARTMENT

HPH448: DIGITAL COMMUNICATION SYSTEMS EXAMINATION

DURATION: THREE HOURS

Answer **ALL** parts of Section A and any **THREE** questions from Section B.
Section A carries 40 marks and each question in Section B carries 20 marks.

SECTION A

1. (a) What is a communication channel? Name any four types of communication channels. [2;4]

(b) Explain concisely the main advantage of using digital communication instead of analogue communication. [4]

(c) What is the main disadvantage of using digital communication instead of analogue communication? [2]

(d) How is bit error rate (BER) used to analyze the performance of a system? [4]

(e) (i) What is signal-to-noise ratio (SNR)? [2]

(ii) In terms of signal quality, what does a higher SNR represent? [1]

(f) Briefly explain the concept of time division multiplexing (TDM). [6]

(g) Briefly describe spread spectrum systems. [6]

(h) What is multiple access? [3]

(i) Make a comparison between frequency division multiplexing (FDM) and time division multiplexing (TDM). [6]

SECTION B

2. Discuss the following digital modulation techniques with the aid of clearly labelled diagrams:
   (a) amplitude shift keying (ASK). [7]
   (b) frequency shift keying (FSK). [7]
   (c) phase shift keying (PSK). [6]

3. Draw the block diagram of a digital communication system, and describe the function of each component. [20]

4. (a) With the aid of clearly labelled diagrams, discuss the following signal classification categories:
      (i) periodic signal. [4]
      (ii) aperiodic signal. [4]
      (iii) random signal. [4]
   (b) (i) What is multiplexing? [3]
      (ii) Briefly discuss the importance of multiplexing. [5]

5. (a) Define:
      (i) frequency division multiple access (FDMA). [2]
      (ii) time division multiple access (TDMA). [2]
   (b) Discuss the advantages of TDMA over FDMA. [16]

6. Discuss the elements of pulse code modulation (PCM) with the aid of a Clearly labelled block diagram. [20]

END OF EXAMINATION