Albaha University Faculty of Engineering Electrical Engineering Dept. TAGSEER Scheme Total Marks: 20	First Term — 1434/1435 Mid-Term Examination Subject: Digital Comm. Systems Date: 6/6/1435 H Time Allowed: 90 Mins
Student Name:	Academic Number: .....

***Answer The Following Questions*:** 20

1. Choose the proper answer i, ii, iii, or iv of the following: [5 marks]

   (a) A 150 watt power is expressed in units of dBW as
   i. 43.52 ii. 21.76 iii. 51.76 iv. 2.176

   (b) Aliasing occurs when
   i. $f_s > 2\text{B}$ ii. $f_s = 2\text{B}$ iii. $f_s < 2\text{B}$ iv. $f_s > 4\text{B}$

   (c) In sampling, the Nyquist rate is given as
   i. $f_s > 2\text{B}$ ii. $f_s = 2\text{B}$ iii. $f_s \leq 2\text{B}$ iv. $f_s > \text{B}/2$

   (d) The quantization level (step) amplitude Δv is given by
   i. $\Delta v = 2m_p/L$ ii. $\Delta v = m_p/L$ iii. $\Delta v = 2m_p \times L$ iv. $\Delta v = 2^n$

   (e) The μ-law and the A-law are used to
   i. obtain a nonuniform quantizing
   ii. get smaller quantization noise for smaller input signal power
   iii. make the SNR practically independent of the input signal power over a large dynamic range
   iv. all of the above

2. Put true $\surd$ or false $\times$ next to each of the following sentences: [5 marks]

   (a) The unit dBm is dimensionless. $\langle\times\rangle$

   (b) In PCM system, the pulse detection error is quite small compared to the quantization error. $\langle\surd\rangle$

   (c) The maximum information rate is two pieces of information per second per Hertz. $\langle\surd\rangle$

   (d) Sampling $g(t)$ by a train of pulses of finite width doesn't matter in recovering it provided that the sampling rate is not below the Nyquist rate. $\langle\surd\rangle$

   (e) Theoretically, an ideal low-pass filter can reconstruct the received signal that is sampled at Nyquist rate. $\langle\surd\rangle$

3. Mention four different advantages of digital communications. [4 marks]

Answer

Select four advantages of digital communications.

4. The American Standard Code for Information Interchange (ASCII) has 128 characters, which are binary coded. If a certain computer generates 100,000 characters per second, determine the following: [6 marks]

   (a) The number of bits (binary digits) required per character.

   (b) The number of bits per second required to transmit the computer output, and the minimum bandwidth required to transmit this signal.

   (c) For single error-detection capability, an additional bit (parity bit) is added to the code of each character. Modify your answers in parts (a) and (b) in view of this information.

Answer:
a) The number of bits required per character is $n = \log_2 128 = 7\,\text{bits}$
b) $100,000 \times 7 = 700$ kbps, minimum BW = 700,000/2 =350 kHz
c) now answer a) is 8 bits
and answer b) is $100,000 \times 8 = 800$ kbps, minimum BW =800,000/2 = 400 kHz