

Name: **KEY**

Sec. 1

1. How many bits are required to store video+audio stream of 3 seconds using N95 Nokia?
 For the video assume: 5 Mega-pixels/frame, 20 frames/sec, 3 colors, 8 bits/color/pixel.
 For the sound assume: 16 bits/sample of sound using 22k sample/second.

③ Video : $5 \text{ M} \frac{\cancel{\text{pixels}}}{\cancel{\text{frame}}} * 20 \frac{\cancel{\text{frame}}}{\cancel{\text{sec}}} * 3 \text{ colors} * 8 \frac{\text{bits}}{\text{color} \cdot \cancel{\text{pixel}}} * 3 \text{ sec.}$
 $= 5 \text{ M} * 20 * 3 * 8 * 3 \text{ bits} = 7200 \text{ M bits}$

② Audio : $16 \frac{\text{bits}}{\cancel{\text{sample}}} * 22 \text{ K} \frac{\cancel{\text{sample}}}{\cancel{\text{sec}}} * 3 \text{ sec.}$
 $= 16 * 22 \text{ K} * 3 \text{ bits} = 1056 \text{ K bits}$

① Video + Audio = $7200 \text{ M} + 1056 \text{ K}$
 $= 7.201056 \text{ Gbits}$

2. For the line codes shown in the figure which one has (Could be more than one code or none). Fill in the table using CAPITAL letters

Zero DC	B D E
Error Detection capability	D
Require minimum bandwidth	A B
Requires two supplies	B D E

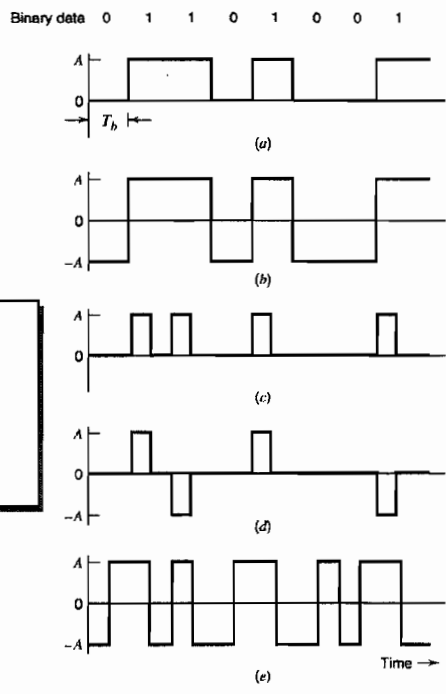


Figure
 Line codes for the electrical representations of binary data.
(A) Unipolar NRZ signaling. **(B)** Polar NRZ signaling.
(C) Unipolar RZ signaling. **(D)** Bipolar RZ signaling.
(E) Split-phase or Manchester code.