

EE 4980
Modern Electronic Systems

HW 4

Assuming a $2\text{Tb}/\text{in}^2$ areal density on a HDD platter, with a 3 to 1 width to length ratio of a bit and 40% spacing on each side (40% of the width) – calculate the length and width of a bit in nm. 15pts

Your (2,7) RLL decoder generated the following data stream, provide the decoded bit stream in HEX 15 pts

NNNTNNNNTNNTNNTNNTNNTNNTNNTN

NNNTNNNTNNTNNTNNNNNTNNTNNTN

Describe what Write-Wide, Read-Narrow means and why we would use it

5 pts

Why do HDDs need to use RLL codes?

5 pts

What mechanism prevents head slaps in normal rotating operation of a HDD

5 pts

Calculate the best case and worst case read delay for the following DVD player
20 pts

Sled radial speed – 1mm/ms

Total sled read travel distance - 7.5cm

Disk rotation speed 5600 rpm

Radius at inside track – 0.4inches

Read channel delay (electronics) – 150us

Search and Think

25 pts

Propose a circuit to measure the output of a GMR HDD sensor
Keep it simple – (if you use a Wheatstone Bridge you must document how you intend to determine the bit value and bias the sensor)

Search and Think

10pts

Provide a short description of HAMR as it applies to Hard Disk Drives