1. Closed books and closed notes.
2. You can only use the four-page cheat sheet handout.
3. Please show all the steps in your work.
4. You may work problems in any order. At the end please arrange as 1,2,3,4,5…
5. Please print your name and last four digits of your ID.
6. Write on one side of the paper only.
7. No cheating.
Q1. What is a discriminator? Describe with a block diagram and show how it works.

Q2. What is a band-pass limiter? Describe its purpose.

Q3. Describe in detail the roles of preemphasis and deemphasis filters in FM broadcasting.

Q4. Consider sampling of a signal band-limited to B Hz
   a) What is the Nyquist rate for this signal?
   b) What happens if the band-limited signal is sampled below the Nyquist rate, Identify this with a frequency spectra (sketch)?

Q5. Answer the following:
   a) What is PCM?
   b) What is a uniform quantizer? Sketch.
   c) If a signal ranges from (-mp) to (mp) and is uniformly quantized to L levels, what is the maximum quantization error?

Q6. What is a compander? Describe in detail and show a block diagram.
Q7. What is a TDM? What are its advantages?

Q8. Describe DPCM? show a block diagram and state its advantages?

Q9. Repeat problem 8 for DM.

Q10. In DM, what are over-load and granular noises? How can these be reduced or eliminated?