

## EEE 317 Tutorial questions – M-Ary signalling.

- 1) Sketch a circuit capable of demodulating a QPSK signal.
- 2) Discuss some of the disadvantages of utilising QAM modulated signals compared to PSK signals.
- 3) Sketch an example of a constellation diagram for each of the following M-Ary signals,
  - a) 3-PSK
  - b) 4-ASK
  - c) OQPSK
  - d) 8-QAM
- 4) Calculate the BWE for
  - a) 2-PSK
  - b) 3-PSK
  - c) 8-PSK
- 5) How does the BWE of 8-QAM compare to that of 8-PSK? You should justify your answer.
- 6) The bit error performance of an M-Ary PSK signal degrades as we increase M and keep everything else the same, explain why with the aid of a constellation diagram. Explain, with the aid of another constellation diagram, how this reduction in error performance can be remedied by changing the system without reducing M.