

# Digital Communication: UE18EC352

VI Sem ECE, PESU: Jan-May 2021

## Experiment-2: Pulse shaping with Nyquist pulses

### Steps:

1. Set  $R_b = 100$  Hz and  $T_{max} = 10T_b$ . You can use  $T_r = 0.001$  as the time resolution for plotting  $p(t)$ .

2. Generate the raised cosine pulse

$$p(t) = \begin{cases} \frac{\text{sinc}(R_b t) \cos(\pi \alpha R_b t)}{1 - 4\alpha^2 R_b^2 t^2} & -T_{max} < t < T_{max} \\ 0 & elsewhere \end{cases}$$

3. Find  $P(f)$ . Plot  $p(t)$  and  $P(f)$  for different values of  $\alpha$  between 0 and 1. Note the bandwidth in each case.
4. Repeat with  $T_{max} = 3T_b$ . Note the effect of truncating  $p(t)$  on  $P(f)$  as  $\alpha$  varies.
5. Repeat with  $p(t) = \text{sinc}^2(R_b t)$ . Note the effect of truncating  $p(t)$  on  $P(f)$  in this case too.
6. Plot  $p(t)$  and  $P(f)$  for the following cases:
  - (a) Raised cosine pulse shaping with  $T_{max} = 10T_b$  and  $\alpha = 0$
  - (b) Raised cosine pulse shaping with  $T_{max} = 10T_b$  and  $\alpha = 0.5$
  - (c) Raised cosine pulse shaping with  $T_{max} = 10T_b$  and  $\alpha = 1$
  - (d) Raised cosine pulse shaping with  $T_{max} = 3T_b$  and  $\alpha = 0$
  - (e) Raised cosine pulse shaping with  $T_{max} = 3T_b$  and  $\alpha = 0.5$
  - (f) Raised cosine pulse shaping with  $T_{max} = 3T_b$  and  $\alpha = 1$
  - (g)  $\text{sinc}^2$  pulse shaping with  $T_{max} = 10T_b$
  - (h)  $\text{sinc}^2$  pulse shaping with  $T_{max} = 3T_b$