(7) A multipath fading channel has a multi-path of $T_m = 1s$ and a doppler spread $B_d = 0.01\ Hz$. The total channel bandwidth at baud pass available for signal transmission is $W = 5\ Hz$. To reduce the effects of intersymbol interference, the signal designer selects a pulse duration $T = 10\ sec$. find,

(a) Determine the Coherence bandwidth and the Coherence time

$$\Rightarrow (\Delta f)_c \cong \frac{1}{T_m} = 1\ Hz$$

$\because T_m = 1s$

$$(\Delta t)_c \cong \frac{1}{B_d} \cong \frac{1}{0.01} = 100\ sec$$

(b) Is the channel frequency selective? explain

$\Rightarrow$ yes.

$\because$ Signal B.W. 'W' $= 5\ Hz$ is much $>$ Coherence BW, $1\ Hz$

(c) Is the channel fading slowly / rapidly? explain

$\Rightarrow$ slowly.

$\because$ the signal duration, $10\ sec$ is much smaller than the coherence time, $100\ sec$

(8) A multipath fading channel has a multipath spread of $T_m = 2$ sec, and a Doppler spread $B_d = 0.04$ Hz. The total channel BW of bandpass available for signal transmission is $W = 5$ Hz. To reduce the effects of inter symbol interference, the signal designed select a pulse duration of $T = 20$ sec. find,

(a) Determine the coherence bandwidth and the coherence time of the channel

$$(\Delta f)_c \cong \frac{1}{T_m} = \frac{1}{2} = 0.5 \text{ Hz}$$

$$(\Delta t)_c \cong \frac{1}{B_d} = \frac{1}{0.04} = 25 \text{ sec}$$

(b) Is the channel frequency selective? explain

⇒ Yes.

∵ Signal B.W $W = 5$ Hz is much > Coherence BW, 0.5 Hz

(c) Is the channel fading slowly / rapidly? explain

⇒ slowly.

∵ the signal duration, 20 sec is much smaller than the coherence time, 25 sec.