COURSE CODE (CREDITS): 18B11EC413 (4)   MAX. MARKS: 25

COURSE NAME: Modern Analog and Digital Communication

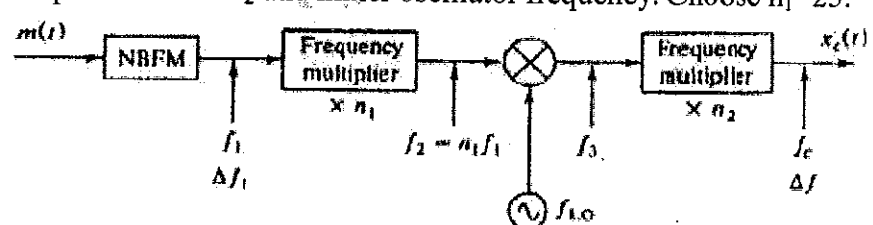COURSE INSTRUCTORS: Dr. Alok Kumar   MAX. TIME: 1 Hour 30 Min

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required

for solving problems

Q.No	Question	CO	Marks
Q.1	Derive the time domain expression of a single tone frequency modulated (FM) signal. Draw the schematic diagram of NBFM. What are the advantages and disadvantage of FM?	CO-2	5
Q.2	Consider an FM signal $V_{FM}(t) = 10Cos[2\pi * 10^6 t + 5Sin(2\pi 10^3 t)]$, Find the (a) Approximate bandwidth of FM signal. (b) Bandwidth of FM signals when message frequency is halved. (c) Maximum phase deviation (d) Maximum frequency deviation	CO-2	4
Q.3	In an Armstrong –type FM generator as shown in Fig.1, the crystal oscillator frequency is 200 KHz. The maximum phase deviation is limited to 2 Hz. Let frequency of message signal is 50 Hz and frequency of carrier signal at the output is 75KHz. Select the multiplier value of n_2 and mixer oscillator frequency. Choose $n_1=25$. **Fig.1**	CO-2	4
Q.4	Draw the block diagram for super heterodyne receiver and describe its operation and the primary function of each stage.	CO-1	4
Q.5	Consider a signal $v(t) = 2Cos(2\pi * 110t)Cos(2\pi * 10t)$ is sampled at the rate of 250 samples per second. Determine a) the maximum frequency component present in the input signal, b) Nyquist rate c) Cut of frequency of the ideal reconstruction filter so as to recover the signal from its sample version.	CO-3	4
Q.6	State and prove the sampling theorem for baseband signal.	CO-3	4