Exam.Code:0928
Sub. Code: 33650

2015

B.E. (Electronics and Communication Engineering)

Fourth Semester

EC-401: Communication Engineering

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part. Use of scientific calculator is allowed.

x-x-x

I. **(a)** What do you mean by image frequency rejection ratio. **(2)**

(b) Under what conditions the bandwidth of FM signal is same as that of AM signal. **(2)**

(c) A Radio transmitter radiated 10KW and carrier power is 8.5KW. Calculate modulation index. **(2)**

(d) Define slope overload and granular noise in DM systems. How these noises can be eliminated. **(2)**

(e) Calculate the bandwidth of following angle modulated wave.

$$x(t) = 10\cos(2\pi \times 10^8 t + 200\cos 2\pi \times 10^3 t)$$ **(2)**

Part- A

II. **(a)** Explain Costa's receiver and its applications. **(5)**

(b) Prove that narrowband FM wave offers no improvement in SNR over AM. **(5)**

III. **(a)** A modulated signal is given as

$$u(t) = 100\cos\left[200\pi t + 10\int_{-\infty}^{\tau} m(\tau)d\tau\right]$$ where m(t) is

(i) is this a PM or FM signal (ii) Find the modulation index and the estimated transmission bandwidth (iii) Find peak frequency deviation. **(5)**

(b) Draw and explain PPM modulator and demodulator. **(5)**

IV **(a)** Derive linear and non-linear model of PLL systems. **(5)**

(b) Derive low and upper sampling frequency conditions for proper reconstruction of band-Pass signals. **(5)**

Part-B

V. Consider Delta Modulation (DM) system designed to accommodate analog message signal limited to bandwidth W = 5KHz, A sinusoidal test signal of amplitude A = 1volts and frequency f_m = 1 KHz is applied to the system. The sampling frequency of the systems is 50KHz.

(a) Calculate step size Δ required to minimize slope overload.

(b) Calculate the signal to quantization noise ratio of the DM system. **(10)**

VI. **(a)** Define raised cosine pulse. Draw its sketch in both time and frequency domains. How it is helpful in mitigating ISI. **(5)**

(b) What are the ways to minimize quantization error. Discuss noise-bandwidth trade-off in PCM systems. **(5)**

VII.(a) Derive expression for figure of merit in SSBSC system. **(5)**

(b) Consider signal shown below. **(5)**

(i) Determine impulse response of filter matched to this signal and sketch it as function of time.

(ii) Plot the matched filter output as function of time.

(iii) What is the peak value of the output?