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II B.Tech I Semester(RR) Supplementary Examinations, May/June 2010
SIGNALS AND MODULATION THEORY
(Electronics & Computer Engineering)

Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Explain about the singularity functions.
   (b) Determine the F.T of the given functions and give the value of |f(w)| as $w \rightarrow \infty$ $f(t) = e^{-t}u(t) + \partial(t-2)$ [6+10]

2. (a) Define auto-correlation and cross-correlation functions. Prove that $\phi_{12}(\iota) = \phi_{21}(\iota)$, where $\phi_{12}(\iota)$ is the correlation between $f_1(t)$ and $f_2(t)$ and $\phi_{21}(\iota)$ is the correlation between $f_2(t)$ and $f_1(t)$.
   (b) Find the auto-correlation of f(t)=Sin wt.   [8+8]

3. (a) Prove that the transfer function of the system must be constant for all frequencies to achieve distortion less transmission.
   (b) Find the Impulse response of High Pass filter?   [10+6]

4. (a) Explain Balance Modulator for AM.
   (b) Determine the maximum upper , lower & total side band power for an unmodulated carrier power $P_c = 2000W$ .Determine the maximum total power (P_t) for an AM system.   [8+8]

5. (a) Determine the value of the capacity reactance obtainable from a reactance FET whose gm is 12ms. Assume that the gate to source resistance is $1/9^{th}$ of the reactance of the gate to drain capacitor and that the frequency is 5MHz.
   (b) Explain how the ratio detector demodulates on FM signal, proving that the output voltage is proportioned to the difference between the individual input voltages to the diodes.   [8+8]

6. (a) Derive the expression for transfer function of flat top sampled signal.
   (b) If m(t) is band limited that is m(w)=0, for|w| >w_m Then show that
   $$\int_{-\infty}^{\infty} |m(t)|^2 dt = T_s \sum_{n=-\infty}^{\infty} [m(nT_s)]^2 \ where \ Ts = \frac{\pi}{w_m}$$ [8+8]

7. (a) With a neat block diagram explain the generation and reception of DPSK signals. What merit does a DPSK signal have over FSK and PSK.
   (b) Show that a QPSK system achieves twice the bit rate per carrier bandwidth that a binary antipodal FSK system with the same bit error probability and power level does.   [8+8]

8. Write short notes on
   (a) Bipolar coding
   (b) Manchester coding   [8+8]

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