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Roll No. ....

## EX-504(O)

**B. E. (Fifth Semester) EXAMINATION, Dec., 2009**

**(Old Scheme)**

**(Electrical & Electronics Engg. Branch)**

**ANALOG AND DIGITAL COMMUNICATION**

**[EX-504(O)]**

*Time : Three Hours*

*Maximum Marks : 100*

*Minimum Pass Marks : 35*

**Note :** Attempt any *five* questions. All questions carry equal marks.

1. (a) Find the Fourier transform of the following functions and sketch them :
  - (i)  $\text{Sgn}(t)$
  - (ii)  $\cos \omega_0 t u(t)$
- (b) State and prove Parseval's theorem for energy signal.
2. (a) Define convolution. State and prove time convolution theorem in Fourier transform.
- (b) Explain impulse response of an Ideal low pass filter.
3. (a) A single tone modulating signal  $c_m = E_m \cos \omega_m t$  amplitude modulates a carrier  $e_c = E_c \cos \omega_c t$ . Derive an expression for the AM wave and also derive an expression for modulation index.
- (b) Explain the working of envelope detector.

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4. (a) Explain various types of frequency modulation. Also discuss the spectrum and transmission bandwidth of FM.  
(b) Explain synchronous detection for SSB-SC signals.
5. (a) State and prove sampling theorem. How the sampled signal is recovered using LPF ?  
(b) Explain PCM technique. Why PCM is noise resistant than other forms of pulse modulation ?
6. (a) Explain BFSK technique. Specify the bandwidth requirement and probability of error.  
(b) Draw the schematic diagram of QPSK generating system and explain its working.
7. (a) Use Huffman coding to find the coding efficiency for the following message ensemble :  
 $[X] = [X_1 \ X_2 \ X_3 \ X_4 \ X_5 \ X_6 \ X_7 \ X_8]$   
 $[P] = [0.1 \ 0.25 \ 0.15 \ 0.05 \ 0.15 \ 0.1 \ 0.05 \ 0.15]$   
(b) Define mutual information and find the channel capacity of binary symmetric channel.
8. Write short notes on any *two* of the following :
  - (i) Quantization
  - (ii) Differential PCM (DPCM)
  - (iii) ASK
  - (iv) Adaptive Delta modulation
  - (v) Cyclic code and Convolution codes