

**D 90138**

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Name

Reg. No.



**FIFTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE  
EXAMINATION, NOVEMBER 2015**

**EC/PTEC 09 504—DIGITAL COMMUNICATION**

Time : Three Hours

Maximum : 70 Marks

**Part A**

*Answer all questions.*

1. What is aperture effect ? How could it be reduced ?
2. Sketch a NRZ polar format for the stream of bits 1100001.
3. State Gram-Schmidt orthogonalization procedure.
4. Mention the applications of spread spectrum modulation.
5. What is the difference between PSK and FSK ?

(5 × 2 = 10 marks)

**Part B**

*Answer any four questions.*

6. What are the disadvantages of delta modulation ? How is it removed in adaptive delta modulation ?
7. Explain the sampling theorem for band-pass signals with suitable spectrum.
8. Illustrate the interpretation of eye pattern with a neat diagram.
9. Explain the functionality of correlation receiver. How is it different from matched filter ?
10. A pseudo noise sequence is generated using a feedback shift register of length  $m = 4$ . The chip rate is  $10^7$  chips per second. Find the length, chip duration and period of the PN sequence.
11. Compare the various digital modulation schemes.

(4 × 5 = 20 marks)

**Part C**

*Answer all questions.*

12. (a) (i) With suitable block diagram and waveforms, explain the concept of PAM/TDM system for N number of channels.  
(6 marks)
- (ii) Twenty four voice signals are sampled uniformly and then time division multiplexed, the sampling operation uses flat top samples with  $1 \mu\text{s}$  duration. The synchronization is provided by adding an extra pulse of  $1 \mu\text{s}$  duration. The highest frequency component of each voice signal is 3.4 kHz. Calculate the spacing between successive pulses of multiplexed signal for a sampling rate of 8 kHz and Nyquist rate.  
(4 marks)

Or

**Turn over**

- (b) (i) Derive the expression of signal to noise ratio for uniform quantization. (7 marks)  
(ii) Discuss the characteristics of  $\mu$ -law and A-law for companding. (3 marks)

13. (a) Derive the Nyquist's criterion for distortionless baseband binary transmission.

*Or*

- (b) (i) Discuss the simple duobinary encoder with respective frequency response. (6 marks)  
(ii) Write short notes on zero forcing equalizer. (4 marks)

14. (a) What is a direct sequence spread spectrum technique? Analyze the performance of the same.

*Or*

- (b) (i) Mention the principles of frequency hopped spread spectrum. (3 marks)  
(ii) Discuss the differences between slow and fast frequency hopping. (7 marks)

15. (a) Explain the block diagram of MSK transmitter and receiver with waveforms. Also obtain the power spectral density and bandwidth of MSK.

*Or*

- (b) (i) Derive the bit error probability for coherently detected binary orthogonal FSK. (6 marks)  
(ii) Write short notes on carrier synchronization. (4 marks)

[4 × 10 = 40 marks]