

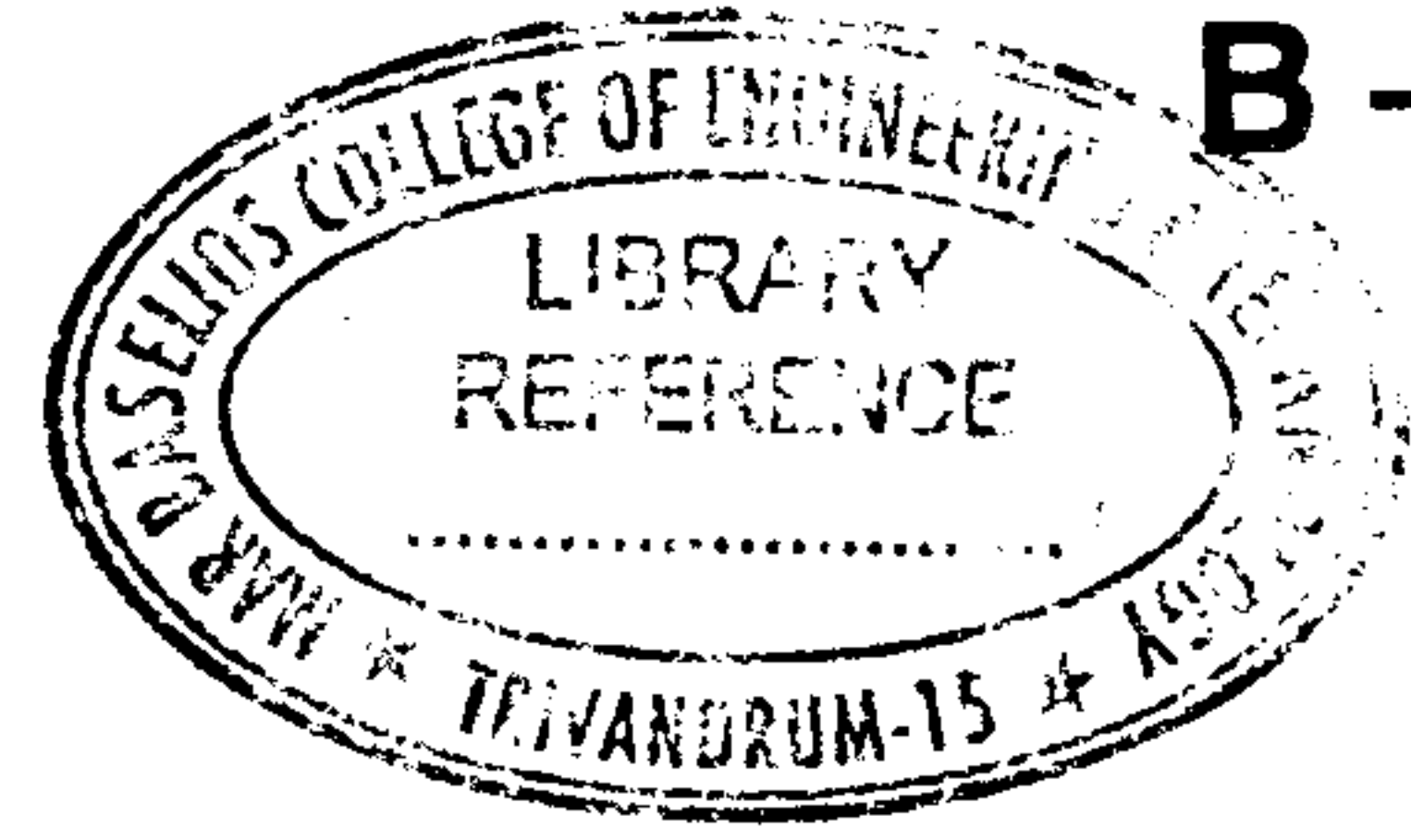


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Reg. No. : .....

Name : .....



**First Semester M.Tech. Degree Examination, December 2016  
(2008 Scheme)**

**Branch : ELECTRONICS AND COMMUNICATION ENGINEERING**

**Stream : Telecommunication Engineering**

**TTC 1003 : Modern Digital Communication Techniques**

Time : 3 Hours

Max. Marks : 100

**Instructions :** i) Answer **any five** questions.  
ii) **All** questions carry **equal** marks.

1. a) Consider the binary communication system that is sent information using one of two signals given below :

$$s_0(t) = 1 \text{ for } 0 \leq t \leq 0.5 \quad \text{and} \quad s_0(t) = -1 \text{ for } 0 \leq t \leq 0.5 \\ -1 \text{ for } 0.5 \leq t \leq 1 \quad \quad \quad 1 \text{ for } 0.5 \leq t \leq 1$$

Assuming equilikely signals and an AWGN channel with two sided power spectral density  $N_0/2$ , design the optimum receiver, using the minimum number of correlators and compute the probability of error for  $N_0 = 2$  Watts/Hz. **12**

- b) Derive the probability of error for envelop detection of M-ary orthogonal signals. **8**

2. a) Assume that a matched filter has the impulse response

$$h(t) = 5 \text{ for } 0 \leq t \leq 1 \\ = 0 \text{ otherwise}$$

A signal  $s(t) = e^{-2t}$ , for  $0 \leq t \leq 1$ , disturbed by Gaussian noise is received through this matched filter. What is the peak signal to noise ratio at the output of matched filter ? **8**

- b) Derive optimum receiver structure for detecting the modulated sinusoidal carrier signal with random phase in the presence of additive non-white Gaussian noise. **12**

3. a) Derive the optimum non-coherent receiver for the Rayleigh channel. **10**

- b) Explain wide band and narrow band fading models. **10**

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- 4. a) Derive the expression for the average probability of error for DPSK modulation in Nagagami-m fading. 10
- b) Draw the block diagram of adaptive equalizer and explain with adaptive algorithm. 10
- 5. a) Explain duo-binary and modified duo-binary signaling schemes with and without precoder. 10
- b) Explain frequency hopping spread spectrum system with block diagram. 10
- 6. a) Define the term processing gain of a direct sequence spread spectrum system and explain its significance. 10
- b) What are Gold sequence ? How are they generated ? 6
- c) Explain about synchronization schemes. 4

