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**Question Paper Code : 80337**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fourth Semester

Electronics and Communication Engineering

EC 6402 — COMMUNICATION THEORY

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Suggest a modulation scheme for the broad cast video transmission and justify.
2. What are the advantages of converting low frequency signal in to high frequency signal?
3. Define modulation index of frequency modulation and phase modulation.
4. What is the need for pre – emphasis?
5. State Central Limit Theorem.
6. Write Einstein – Wiener – Khintchine relation.
7. Two resistors of 20 k, 50 k are at room temperature (290 k). For a bandwidth of 100 khz. Calculate the thermal noise voltage generated by two resistors in series.
8. Define noise figure and noise equivalent temperature.
9. State Shannon's channel capacity theorem, for a power and band limited channel.
10. A source generates 3 message with probabilities of 0.5, 0.25, 0.25. Calculate source entropy.

PART B — (5 × 16 = 80 marks)

11. (a) Derive the expression for amplitude modulated wave and explain any one method to generate and demodulate it. (16)

Or

- (b) Derive the expression for DSB-SC AM. Explain a method to generate and detect it. (16)

12. (a) (i) Derive an expression for a single tone FM signal with necessary diagrams and draw its frequency spectrum. (10)  
(ii) Explain the working operation of balanced slope detector. (6)

Or

- (b) (i) Explain the direct method of FM generation. (8)  
(ii) Write about the basic principles of FM detection and explain about Ratio detector. (8)
13. (a) (i) Define the following terms mean, correlation, covariance and ergodicity. (8)  
(ii) Explain in detail about the transmission of a random process through a linear time invariant filter. (8)

Or

- (b) (i) When is a random process said to be Strict Sense Stationary (SSS), Wide Sense Stationary (WSS) and Ergodic process. (8)  
(ii) What is a Gaussian random process and mention its properties. (8)
14. (a) (i) Define noise and write notes on Shot noise, Thermal noise and White noise. (8)  
(ii) Derive the figure of merit for AM system. Assume coherent detection. (8)

Or

- (b) Explain the noise in FM receiver and calculate the figure of merit for a FM system.
15. (a) State Shannon's various theorems and explain. (16)

Or

- (b) A discrete memoryless source has five symbols  $x_1, x_2, x_3, x_4$  and  $x_5$  with probabilities 0.4, 0.19, 0.16, 0.15 and 0.15 respectively attached to every symbol.
- (i) Construct a Shannon - Fano code for the source and calculate code efficiency.
- (ii) Construct the Huffman code and compare the two source coding techniques. (16)