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Question Paper Code : 60448

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

Fourth Semester

Electronics and Communication Engineering

EC 2252/EC 42/EC 1252/080290020 — COMMUNICATION THEORY

(Regulations 2008)

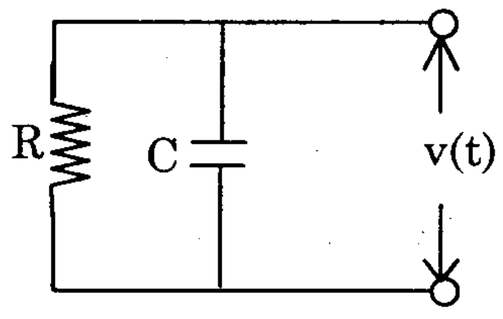
(Common to PTEC 2252 Communication Theory for B.E. (Part-Time) Third Semester – ECE – Regulations 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. For the baseband signal $m(t) = \cos(\omega_m t)$, find the DSB-SC signal and sketch its spectrum.
2. Define VSB and state any one of its application.
3. Define the modulation index of FM.
4. What is the need for pre emphasis?
5. Draw a random variable. Specify the sample space and the random variable for a coin tossing experiment.
6. Calculate thermal noise voltage across the simple RC circuit shown with R=1k Ω and C=1μF at T=27°C.



7. What are the methods to improve FM threshold reduction?
8. What is capture effect?
9. State source coding theorem.
10. Define Shannon's channel coding theorem.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Define Amplitude modulation. How an amplitude modulated signal can be generated using a non-linear modulator circuit? (8)

(ii) What is a DSB-SC signal? Write the working of a synchronous detector used to detect a DSB-SC signal with the output amplitude spectrum of each block. (8)

Or

(b) (i) Discuss in detail about frequency translation and frequency division multiplexing technique with diagrams. (10)

(ii) Compare Amplitude Modulation and frequency Modulation. (6)

12. (a) (i) The message signal $m(t) = a\cos(2\pi f_m t)$ is used to either frequency modulate or phase modulate the carrier $A_c \cos(2\pi f_c t)$. ,Find the modulated signal in each case. (4)

(ii) Bring out the relationship between PM and FM. (4)

(iii) Describe a method each for generation and demodulation of FM signal. (8)

Or

(b) (i) An angle modulated signal has the form $u(t) = 100\cos[2\pi f_c t + 4\sin 2000\pi t]$ where $f_c = 10$ MHz. Determine the average transmitted power, peak phase deviation and peak frequency deviation. Is this an FM or a PM signal? Explain. (6)

(ii) With the relevant expressions and figures (if any), compare and contrast narrowband and wideband FM. (10)

13. (a) Write short notes on Shot noise, Thermal noise, White noise.

Or

(b) Write the details about narrow band noise and the properties of quadrature components of narrowband noise.

14. (a) (i) Draw the super heterodyne receiver and explain the operation of each block. (10)

(ii) Derive the figure of merit for AM system for non coherent system, with suitable assumptions. (6)

Or

(b) (i) Derive the figure of merit of a FM system. (10)

(ii) Explain FM threshold effect. (6)

15. (a) (i) Consider a discrete memory less source with seven possible symbols $X_i = \{1, 2, 3, 4, 5, 6, 7\}$ with associated probability Pr = {0.37, 0.33, 0.16, 0.07, 0.04, 0.02, 0.01}. Construct the Huffman's code and determine the coding efficiency and redundancy. (10)

(ii) A Discrete memory less source emits 5 symbols whose associated probabilities are as given below. Construct Shannon Fano code and determine the efficiency. (6)

Symbols :	X0	X1	X2	X3	X4
Probabilities:	0.4	0.19	0.16	0.15	0.1

Or

(b) (i) Derive the channel capacity of a continuous band limited white Gaussian noise channel. (10)

(ii) Discuss about rate distortion theory. (6)