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Question Paper Code : 51448

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 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)

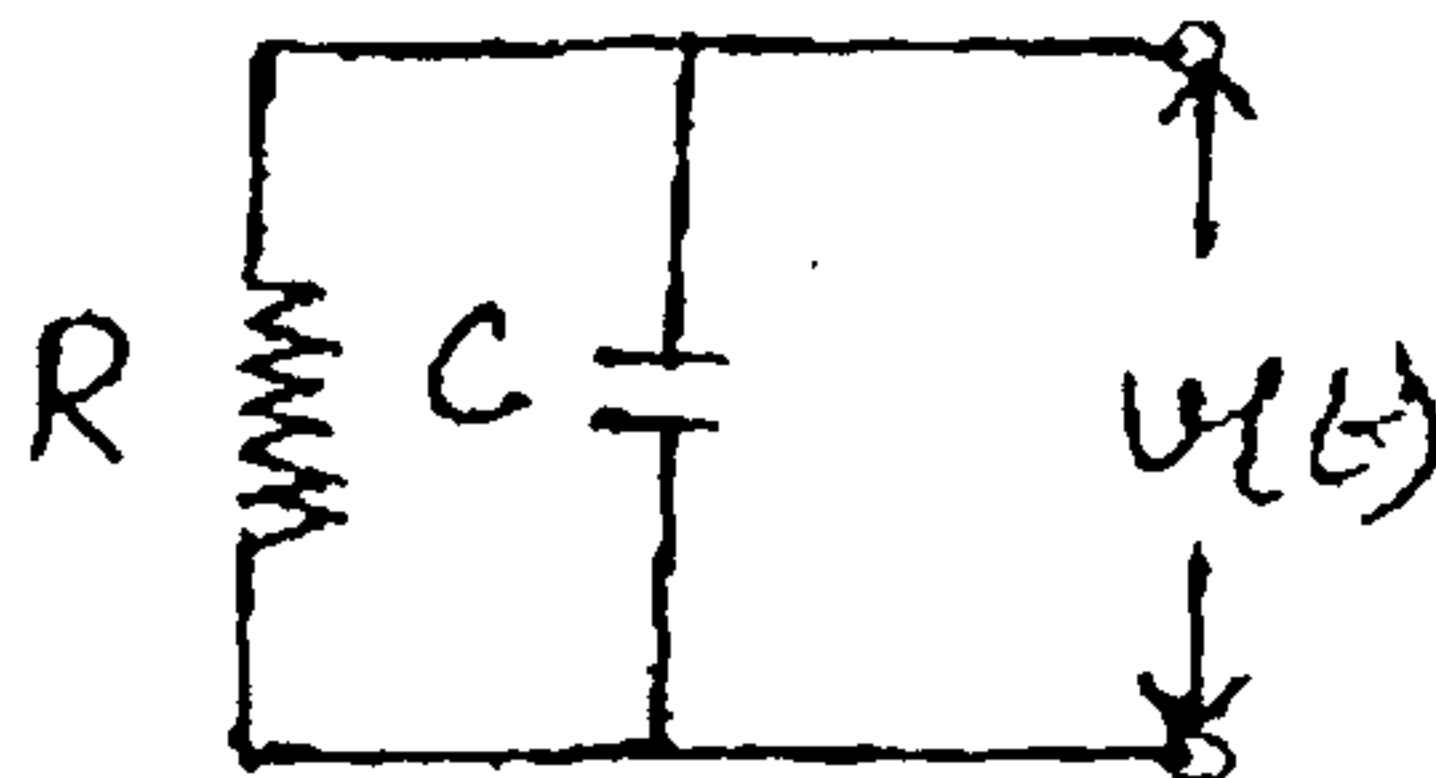
Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. What are the advantages of converting the low frequency signal into high frequency signal ?
2. Compare Bandwidth and power requirement in terms of carrier power P_c , for AM, DSB-SC and SSB ?
3. State the Carson's rule.
4. Compare narrowband and wideband FM.
5. Define 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 $R = 1 \text{ k}\Omega$ and $C = 1 \text{ }\mu\text{F}$ at $T = 27 \text{ }^\circ\text{C}$.



7. What are the methods to improve FM threshold reduction ?
8. What is capture effect ?
9. The average information rate is zero for both extremely likely and extremely unlikely message. Is the statement correct ? Why ?
10. What is lossy source coding ?

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Discuss on the frequency components present in a periodic and non-periodic signal. (4)
- (ii) Derive the equation of an AM wave. Also draw the modulated AM wave for various modulation index. (8)
- (iii) The antenna current of an AM transmitter is 8 ampere when only the carrier is sent. The current increases to 8.93 A when the carrier is modulated by a single sine wave. Find the percentage modulation. (4)

OR

- (b) (i) Draw the VSB spectrum and explain the significance. (4)
- (ii) How do you demodulate AM signal ? Explain. (8)
- (iii) A 1000 kHz carrier is simultaneously AM modulated with 300 Hz, 800 Hz and 1.5 kHz audio sine waves. What will be the frequencies present in the output ?

12. (a) (i) Explain the principle of indirect method of generating a wideband FM signal.
- (ii) Discuss the effects of non-linearities in FM systems.

OR

- (b) (i) Draw the circuit diagram of Foster-Seeley discriminator and explain its working.
- (ii) What are the applications of PLL ?

13. (a) Summarise the characteristics of various noise found in a communication channel.

OR

- (b) Derive the equation for finding the probability density function of a one to one differentiable function of a given random variable.

14. (a) Derive an expression for SNR at input (SNR_i) and output of (SNR_o) of a coherent detector. **(16)**

OR

- (b) (i) Derive the output SNR for FM reception. **(8)**
(ii) Explain the significance of pre-emphasis and de-emphasis in FM system. **(8)**
15. (a) (i) A discrete memoryless source emits 4 symbols each with probability 0.25. Construct Shannon Fano codes and Huffman codes for this source. **(10)**
(ii) Discuss in detail about Bandwidth - S/N tradeoff. **(6)**

OR

- (b) (i) Find the capacity of a telephone channel with bandwidth 3000 Hz and SNR 39 dB. **(3)**
(ii) State the physical meaning of Entropy. Determine the entropy of a discrete memoryless source emitting 5 symbols each with probability 0.2. **(3)**
(iii) Write short notes on :
(1) Mutual information and
(2) Rate distortion theory. **(10)**