Reg. No. ☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code: **55333**

B.E./B.Tech. DEGREE EXAMINATIONS, NOV./DEC. 2011
Regulations 2008

Fourth Semester

Electronics and Communication Engineering

EC 2252 Communication Theory
(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 x 2 = 20 marks)

1. How many AM broadcast stations can be accommodated in a 100 kHz bandwidth if the highest frequency modulating a carrier is 5 kHz?

2. What is meant by frequency translation?

3. How is the Narrow band FM converted into wideband FM?

4. What are the advantages of Ratio detector?

5. When is a random process called deterministic?

6. Two resistors of 20 KΩ, 50 KΩ are at room temperature (290 K). For a bandwidth of 100 KHz, calculate the thermal noise voltage generated by the two resistors in series.

7. Define threshold effect in AM receiver.

8. What is FM Threshold effect.

9. Calculate the Entropy of the Source with symbol probabilities 0.6, 0.3 and 0.1.

10. State Shannon's channel capacity theorem, for a power and band limited channel.

Part B - (5 x 16 = 80 marks)

11. (a) With necessary diagrams and expressions explain the generation and demodulation of AM.

(8 + 8)

OR

11. (b) (i) Compare the various amplitude modulation schemes. (6)

(ii) With neat block diagram, explain the transmitter and receiver section of Frequency Division Multiplexing. (10)

12. (a) (i) Define frequency modulation. Draw the FM waveform. Derive an expression for single tone frequency modulation.

(2 + 2 + 6)

(ii) Compare Narrowband and Wideband FM. (6)

OR

12. (b) Write about the basic principles of FM detection and explain about Ratio detector. (4 + 12)

13. (a) (i) When is a random process said to be Strict Sense Stationary (SSS), Wide Sense Stationary (WSS) and Ergodic process?

(6)

(ii) State any five properties of autocorrelation function. (10)

OR

13. (b) (i) Explain Narrowband noise. Show that a narrow band noise $n(t)$ can be represented in terms of its inphase and quadrature phase components. (8)

(ii) Thermal noise from a resistor is measured as 4×10^{-17} W at a temperature of 20°C for a given bandwidth. What will be the Noise power when temperature is changed to 50°. (8)

14. (a) Obtain the expression for figure of merit of DSB-SC receiver using coherent detection. (16)

OR

14. (b) (i) Derive the figure of merit for FM Receiver. (10)

(ii) What is the necessity of pre-emphasis and de-emphasis used in FM System? Explain pre-emphasis and de-emphasis with neat circuit. (6)

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15. (a) (i) Justify the need for an efficient source encoding process in order to increase the average transmitted information per bit, if the source emitted symbols are not equally likely, with an example. Consider a discrete memoryless source for your justification. (8)

(ii) Eight possible messages $m_1, m_2, m_3, m_4, m_5, m_6, m_7$ and m_8 from a source and their probabilities are given.
$P(m_1) = 0.5, P(m_2) = 0.15, P(m_3) = 0.15, P(m_4) = 0.08, P(m_5) = 0.08, P(m_6) = 0.02, P(m_7) = 0.01,$ and $P(m_8) = 0.01$.
Construct the Shannon-Fano coding for each of these messages in order to increase the average information per bit. Find the coding efficiency. (8)

OR

15. (b) (i) State and explain Shannon's theorems on channel capacity.
(12)

(ii) Define Mutual information. State any two properties. (4)

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