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RN-6847

B. E. III (Sem. V) (IT) Examination

May / June – 2010

Communication Techniques

Time : Hours] [Total Marks : **100**

Instruction :

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 3 (Sem. 5) (IT)**

Name of the Subject :

☛ **Communication Techniques**

☛ Subject Code No. : **6 8 4 7** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

SECTION - I

1 (a) Choose the **right** option : **10**

(i) Indicate the 'false' statement. Modulation is used to
- (a) Separate differing transmission
- (b) Reduce the Bandwidth used
- (c) Allow the practicable antennas
- (d) Ensure that intelligence may be transmitted over long distance.

(ii) The modulation index changes from 0 to 1. The transmitted power is
- (a) halved
- (b) Doubled
- (c) Increased by 50%
- (d) Unchanged

(iii) One of the main objective of the R.F. amplifier in superhetrodyne receiver is to
- (a) permit better adjacent channel rejection
- (b) provide improved tracking
- (c) Improve the rejection of image frequency
- (d) Increase the tunning range of receiver

(iv) The noise figure of an amplifier is 7dB, calculate the output signal to noise ratio, when the input signal to noise ratio is 35 dB.
- (a) 5 dB
- (b) 24 dB
- (c) 28 dB
- (d) None of the above

(v) The value of resistor creating thermal noise is doubled. The noise power generated is therefore
  (a) Doubled
  (b) Quadrupled
  (c) Unchanged
  (d) Halved

(vi) Theoretically bandwidth required for a frequency modulated signal is
  (a) Double the modulating signal frequency
  (b) Equal to the modulating signal frequency
  (c) Ten times the modulating signal frequency
  (d) Infinite

(vii) Indicate which one of the following is not the advantage of FM over A.M.
  (a) Lower Bandwidth is required
  (b) The transmitted power is more useful
  (c) Better noise immunity is provided
  (d) Less modulating power is required.

(viii) In AM, the sidebond amplitude
  (a) Can never exceed half the carrier amplitude.
  (b) Equals the carrier amplitude
  (c) Equals the modulating signal amplitude.
  (d) Can exceed the carrier amplitude.

(ix) The most commonly used filter in SSB generation are:
  (a) L-C
  (b) R-C
  (c) Bandpass
  (d) Low pass.

(x) In case of A.M.
  (a) The amplitude of carrier varies in accordance with the frequency of the modulating signal.
  (b) The amplitude of carrier wave remains constant.
  (c) The amplitude of carrier varies in accordance with amplitude of modulating signal.
  (d) The amplitude of carrier varies in accordance with the phase of modulating signal.

(b) Short questions : **2×5=10**

(i) What are the frequency components in an AM wave?

(ii) How can you broadly classify the noise?

(iii) Define modulation index for AM wave in AM system? Also define current relationshiop for AM wave (Transmitted current and carrier current).

(iv) What is transmission bandwidth for F.M.?

(v) What are the functions of mixer stage in superhetrodyne receiver.

2 (i) Explain each block of superhetrodyne radio receiver and also draw a waveform at each point. **7**

(ii) What is sinusoidal F.M? Explain in detail. Also derive the average power in sinusoidal F.M. **8**

OR

2 (i) Explain the operation of square law diode modulator and also derive the expression that shows how it is used for the generation of A.M. **8**

(ii) Draw and explain the operation of varactor diode modulator. **7**

3 Attempt any **three** : **5×3=15**

(i) Write a short-note on thermal noise.

(ii) Derive for power and current content of amplitude modulated wave.

(iii) Write short note on singly balanced modulator.

(iv) Compare and contrast between F.M. and A.M.

(v) An A.M. transmitter radiates 9 k.watts of power when the carrier is unmodulated and 10.125 k watts when the carrier is sinusoidally modulated, find the modulation index. Now if transmitted power is same and carrier power is reduced by 66%. Find the modulation index.

SECTION - II

4 (a) Answer the following in brief : **10**

(i) A digital signal has a bit interval of 40 μ Sec. What is the bit rate?

(ii) State and explain Sampling Theorem.

(iii) State the advantages of PSK and QAM modulation over ASK.

(iv) What is meant by Inverse Multiplexing?

(v) Explain briefly the modes of serial transmission of data.

(b) What is meant by a digital signal? How can the composite signal be decomposed into its individual frequencies? **5**

(c) How is X.21 able to eliminate most of the control circuits of the EIA standards? **5**

5 (a) What is meant by PCM? Explain with the block diagram. Also derive the expression to find signal to noise ratio of the recovered signal. **9**

(b) What is meant by a modem? State the significance of it. Describe in details the modem standards. **9**

OR

5 (a) Explain the significance of digital to analog conversion. What are the four methods that convert a digital signal to an analog signal? explain any two in detail. **9**

(b) What are the two types of TDM? How is one TDM signal separated into its original components? Consider both implementations of TDM. **9**

6 Attempt any **two** : **12**

(i) Highlight the multiplexing application in the telephone system.

(ii) State and describe the requirements of Line coding techniques.

(iii) What are T lines? How can they be used for analog transmission?
