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B. Tech  
CPEC 5308

Seventh Semester Examination – 2007

COMMUNICATION ENGINEERING

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory  
and any five from the rest.

The figures in the right-hand margin  
indicate marks.

1. Answer the following questions :  $2 \times 10$
- (a) Differentiate TDM and FDM.
  - (b) Is it possible to sample voice signal at 5 KHz ? Justify.
  - (c) List the advantages achieved in the process of modulation.

P.T.O.

- (d) A sequence of bits "1 0 1 1 0 0 1 1 0" is transmitted using FSK technique. Draw the waveform transmitted with respect to time.
- (e) Show the frequency contentment of white noise signal. How does it differ from narrow band signal ?
- (f) Radio signals in SW wave can be received at far away distances even to the order of 1000 km but signal from TV transmitters can be at best received up to 100 km distance. Why ?
- (g) List the wave lengths that are typically used in Optical Fiber communication.
- (h) What is the requirement of multiple access in terms of modern communication systems ?

- (i) What are the chief advantages of using man made satellites in modern communication engineering ?
- (j) A communication system uses 100 MHz as carrier frequency. Can this system be used as portable communication equipment ?
2. (a) An analog signal has its frequency components in the range 0 Hz to 5000 Hz. Show a typical spectrum of the signal. This signal is sampled at Nyquist rate. Draw the spectrum of the sampled signal. Show the spectrum of the sampled signal if sampling frequency is varied over a range of 7 KHz to 15 KHz. 5
- (b) List the distinguishing features of analog and digital signals. How can a analog signal be converted to digital signal. Discuss using suitable block diagram. 5



3. (a) The signal  $s(t) = 10 \sin 1000 \pi t + 5 \cos 2000 \pi t$  amplitude modulates a carrier of 50 KHz. Write the equation for the modulated signal if DSBSC is used and Full AM is used. Plot the spectrum of the baseband signal and modulated signals if Full AM, DSBSC and SSB modulation techniques are used. How can you generate DSBSC signal from full AM signal? 5

(b) Write the equation for the instantaneous signal amplitude for a FM signal. Determine the bandwidth required for transmission of FM signal. Show the relationship between FM and PM signals. 5

4. (a) Derive the signal to noise ratio at the output of AM receiver and FM receiver. Hence comment on why FM receivers provide

better performance than AM receiver under similar input noise conditions. 5

(b) Analyze the principle of operation of any two types of antennas. 5

5. (a) Using neat diagram show how use of cells helps to enhance the use of available spectrum in a mobile cellular communication network. Using a seven cell reuse pattern show the frequency usage in a cellular system. 5

(b) Using suitable block diagram analyze the working of a satellite communication system (analyze only the satellite subsystem). Why are the uplink and the down link frequencies different? 5

6. (a) A stream of bits "1 0 1 0 0 1 1 1" is to be transmitted using different techniques.

Draw the signal waveform for transmission using Unipolar NRZ, Bipolar NRZ, RZ techniques. 4

(b) What is quantization error ? When is it encountered? 3

(c) What is function of Pre-emphasis and De-emphasis in a communication system? 3

7. (a) Using suitable block diagram show the process of generation and detection of PSK signal. How is transmission PSK signal better than transmission on electrical pulses? 5

(b) Discuss with suitable waveform and figures the process of demodulation of AM signals. 5

8. Write short notes ;

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(a) Optical Fiber Communication

(b) Narrow band FM signal

(c) Time Division Multiplexing.

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