

**NTK/KW/15/7414/7419**

**Faculty of Engineering and Technology  
Fifth Semester B.E. (Electronics Engg.)/ET/EC  
(C.B.S.) Examination**

**COMMUNICATION ELECTRONICS**

**Time : Three Hours]**

**[Maximum Marks : 80**

**INSTRUCTIONS TO CANDIDATES**

- (1) All questions carry marks as indicated.
  - (2) Answer **SIX** questions out of **TWELVE** questions.
  - (3) Due credit will be given to neatness and adequate dimensions.
  - (4) Assume suitable data wherever necessary.
  - (5) Illustrate your answers wherever necessary with the help of neat sketches.
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1. (a) Derive the expression for power and current in Amplitude Modulation. 7
  - (b) An AM transmitter supplies 10 kW of carrier power to a  $50\ \Omega$  load. It operates at a carrier frequency of 1.2 MHz and is 80 % modulated by a 3 kHz sine wave.
    - (i) Draw the signal in frequency domain with frequency and power scales.
    - (ii) Calculate the total average power in signal.
    - (iii) Calculate R.M.S. voltage of the signal.
    - (iv) Calculate peak voltage of the signal. 7

**OR**

2. (a) With the help of circuit diagram, explain the working of Balance modulator using FETs. 7

- (b) What is Vestigial side band transmission ? Also give the advantages and application of Vestigial Side Band. 7
3. (a) What is frequency modulation ? Derive the expression for instantaneous value and time domain expression for FM signal. 7
- (b) A carrier is frequency modulated by a 4 kHz sine wave resulting in an FM signal having a maximum frequency of 107.218 MHz and minimum frequency of 107.196 MHz. Find :
- (i) Carrier swing
  - (ii) Carrier frequency
  - (iii) Frequency deviation
  - (iv) Modulation Index. 6

**OR**

4. (a) Derive the time domain signal expression for Wide Band FM (WBFM) using Bessel's function. Also derive the expression for power of WBFM Signal. 9
- (b) Explain with diagram how Phase Modulated Signal (PM) can be generated using FM modulator. 4
5. (a) Explain how PWM Signal is generated using Monostable Multivibrator and using slicing circuit. Also give necessary waveforms. 7
- (b) Give the difference between Flat-top sampling and Natural sampling. 6

**OR**

6. (a) Write short note on differential pulse code modulation. Also state its advantages. 7

- (b) 48 Telephone channels each band limited to 3.4 KHz are to be time division multiplexed by using PCM. Calculate the bandwidth of the PCM system for 128 quantization levels and an 8 kHz sampling frequency. 6
7. (a) Write short notes on :
- (i) White Noise 3
- (ii) Flicker Noise. 3
- (b) Derive the Noise figure equation for Two-stage amplifier. 7

OR

8. (a) Define :
- (i) Noise Figure 3
- (ii) Equivalent Noise Temperature. 3
- (b) A mixer stage has a Noise figure of 20 dB. This mixer stage is preceded by an amplifier which has a Noise figure of 9 dB and an available power gain of 15 dB. Find the overall Noise figure referred to the input. 7
9. (a) Define :
- (i) Sensitivity 2
- (ii) Selectivity 2
- (iii) Fidelity 2
- (iv) Image Rejection Ratio. 2

- (b) Calculate the Image Rejection ratio of the receiver having R.F. amplifier and IF amplifier of 450 kHz. If the quality factor of relevant coils are 65 at an incoming frequency of 1200 kHz and 20 MHz.

6

OR

10. (a) Explain Superheterodyne Receiver with the help of block diagram. 7  
(b) Explain the detection of FM using PLL (Phase Locked Loop). 7
11. (a) Explain Time Division Multiplexing (TDM) with proper diagram. Give the difference between Time Division Multiplexing (TDM) and Frequency Division Multiplexing (FDM). 9  
(b) Explain code division Multiplexing in brief. 4

OR

12. Write short notes on :

- (i) Co-axial Cable 4  
(ii) Fiber optics Cable 4  
(iii) Microwave Link. 5