



B.E DEGREE EXAMINATIONS: NOV/DEC 2022

(Regulation 2018)

Fifth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U18ECI5201: Communication Engineering - I

COURSE OUTCOMES

- CO1:** Demonstrate basic building blocks of communication systems (K2).
CO2: Compare the performance of amplitude modulation techniques (K4,S3).
CO3: Implement and analyze angle modulation techniques (K4,S3).
CO4: Discriminate and implement different analog pulse Modulation techniques (K3,S3).
CO5: Apply and demonstrate digital pulse modulation techniques. (K3,S3)

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

- | | | |
|--|-----|-------------------|
| 1. Classify the internal and external noises associated with a communication system. | CO1 | [K ₂] |
| 2. List the types of AM. | CO2 | [K ₁] |
| 3. Show that the power efficiency of DSB-FC is 33.33%. | CO2 | [K ₂] |
| 4. Coherent receivers produce zero output even after receiving the modulated signal – Justify | CO2 | [K ₅] |
| 5. For an FM modulator with a peak frequency deviation 10KHz and $f_m = 10\text{KHz}$, $V_c = 10\text{V}$, $f_c = 500\text{KHz}$. Find the actual minimum bandwidth using Bessel approach.
For $m = 1$, $j_0 = 0.77$, $j_1 = 0.44$, $j_2 = 0.11$, $j_3 = 0.02$ | CO3 | [K ₁] |
| 6. Build a logic to generate phase modulated wave using frequency modulators. | CO3 | [K ₃] |
| 7. List any three analog pulse modulation schemes. | CO4 | [K ₁] |
| 8. Illustrate the block diagram of PWM generator. | CO4 | [K ₂] |
| 9. Compare delta and adaptive delta modulations. | CO5 | [K ₂] |
| 10. List any four Line coding techniques. | CO5 | [K ₁] |

Answer any FIVE Questions: -

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

- | | | | |
|--|---|-----|-------------------|
| 11. a) Interpret the given parameters of a non-ideal amplifier and determine
a. Input SNR (dB)
b. Output SNR (dB)
c. Noise Factor and Noise Figure
Parameters: | 8 | CO1 | [K ₂] |
|--|---|-----|-------------------|

Input signal power = 2×10^{-10} W

Input noise power = 2×10^{-18} W

Power Gain = 1,000,000

Internal Noise (N_d) = 6×10^{-12} W

- b) For a nonlinear amplifier with two input frequencies 5 kHz & 7 kHz, 8 CO1 [K₂]
- a) Determine the first three harmonics present in the output for each input frequency.
 - b) Determine the cross products produced in the output for values of m and n of 1 and 2
 - c) Draw the output frequency spectrum for the harmonics and cross-product frequencies determined in a & b
12. a) For an AM-DSBFC modulator with a carrier frequency $f_c = 100$ kHz and a maximum modulating signal frequency $f_{m(max)} = 5$ kHz, determine 4 CO2 [K₂]
- a. Frequency limits for the upper and lower sidebands.
 - b. Bandwidth.
 - c. Draw the output frequency spectrum.
- b) Illustrate the operation of super heterodyne receiver with a neat block diagram. 12 CO2 [K₂]
13. a) Build the block diagram of FM transmitter using Direct FM generation method. 10 CO3 [K₂]
- Also explain why AFC loop is needed.
- b) A single tone modulating signal when angle modulates a single tone carrier signal produces an angle modulated wave with infinite bandwidth - Justify 6 CO3 [K₅]
14. a) Explain the pulse amplitude modulation technique and its generation methods. 10 CO4 [K₂]
- b) Illustrate the generation of pulse position modulated signal with neat diagram. 6 CO4 [K₂]
15. a) Explain PCM. 10 CO5 [K₂]
- b) For the following sequence {1.2, -0.2, -0.5, 0.4, 0.89, 1.3}, solve and obtain the quantized sequence using a uniform quantizer in the range of (-1.5,1.5) with 4 levels. 6 CO5 [K₃]
16. List the generation methods of SSB-SC and explain any two methods in detail. 16 CO2 [K₂]
