



R22 Regulation

Subject code:4E4DB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech IV Semester Supplementary Examinations, December 2025 ANALOG AND DIGITAL COMMUNICATIONS

(ECE)

Maximum Marks: 60

Date: 18.12.2025

Duration: 3 hours

- Note:**
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

| All the following questions carry equal marks (10X1M=10 Marks) | | Marks | CO | Bloom Tx |
|--|--|-------|-----|----------|
| 1.a) | Justify the need for modulation. | 1M | CO1 | BL2 |
| b) | Define bandwidth efficiency. | 1M | CO1 | BL1 |
| c) | Compare NBFM and WBFM. | 1M | CO2 | BL2 |
| d) | Define carrier swing and percentage modulation of FM. | 1M | CO2 | BL1 |
| e) | State the principle of Super heterodyne receiver. | 1M | CO2 | BL2 |
| f) | Draw the block diagram of FM receiver. | 1M | CO3 | BL2 |
| g) | How PPM is derived from PWM? | 1M | CO3 | BL2 |
| h) | State the principle of Adaptive delta modulation. | 1M | CO4 | BL2 |
| i) | Illustrate the ASK signal for the given message signal 101101. | 1M | CO4 | BL1 |
| j) | Point out the digital modulation technique which gives better error probability. | 1M | CO4 | BL1 |

Part-B

| Answer All the following questions. (5X10M=50Marks) | | Marks | CO | Bloom Tx |
|---|---|-------|-----|----------|
| 2 | Considering single tone modulation, derive time domain and frequency domain expression for AM wave and draw its spectrum. | 10M | CO1 | BL3 |
| OR | | | | |
| 3 | a) Draw a neat block diagram COSTAS receiver used for demodulation of DSBSC wave. | 5M | CO1 | BL3 |
| | b) With necessary equations explain coherent detection of VSB wave. | 5M | | |
| 4 | a) Derive time domain expression representing WBFM wave, also give equation representing its spectrum. | 5M | CO2 | BL3 |
| | b) Derive the expression for single tone frequency modulated signal. | 5M | | |
| OR | | | | |
| 5 | a) With block diagrams and equations explain how PLL can be used for demodulation of FM wave. | 5M | CO2 | BL2 |
| | b) Explain about pre-emphasis and de-emphasis in FM systems. | 5M | | |

| | | | | |
|----|--|----------|-----|-----|
| 6 | a) Explain the characteristics of a radio receiver. b) Explain the operation of Tuned radio frequency (TRF) receiver with the block diagram and mention its advantages and disadvantages. | 4M 6M | CO3 | BL2 |
| OR | | | | |
| 7 | Explain the different types of AGC. | 10M | CO3 | BL2 |
| 8 | Explain the generation and demodulation of PWM. | 10M | CO3 | BL3 |
| OR | | | | |
| 9 | a) Compare FDM & TDM. b) What is companding? Explain the compression laws A-law and μ -law. | 5M 5M | CO4 | BL3 |
| 10 | Define BPSK and explain BPSK transmitter and receiver with relevant diagrams. | 10M | CO5 | BL3 |
| OR | | | | |
| 11 | What is an optimum receiver? Derive its probability of error. | 10M | CO5 | BL4 |