

JK Lakshmipat University, Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular), December 2021
B. Tech. in Electrical & Electronics Engineering, Semester V

Roll No.....

EE1109: Analog and Digital Communications

Time: 2 hrs

Max. Marks: 30

Instructions to students:

1. Do not write anything other than your roll number on question paper
 2. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever required are an integral part of the answer
 3. Use of programmable calculator, class lecture notes/handouts, etc., are not allowed
 4. Assume suitable data wherever required and mention it clearly
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| Q.1 | Showing appropriate waveforms and expressions, derive the mathematical equation for AM wave and in terms of voltage amplitudes $V_{\max}$ and $V_{\min}$, express the modulation index 'm'. If an AM wave with $m = 0.8$ has total sideband power of 4.85 kW, calculate the carrier power and the total power radiated. | 6
(CO 1 & 2) |
| Q.2 | Derive a mathematical equation for FM wave and express the Carson's rule. In an FM modulator, when the modulating frequency is 600 Hz, modulating voltage is 2.4 V, then $m = 1.5$. Calculate index m if the modulating frequency is reduced to 400 Hz and the modulating voltage is simultaneously increased to 3.2 V | 5
(CO 1 & 2) |
| Q.3 | Graphically illustrate the quantization levels and coding format for any analog signal and justify how BER is controlled using SNR of quantization. In terms of rms signal and noise voltages, express the rms mean square error (variance) and derive the dynamic range of receiver in terms of SNR_q . | 8
(CO 5 & 6) |
| Q.4 | Using BPSK - I and BPSK - Q phase, design a QPSK modulator and demodulator block diagrams and show 4 level possible carrier shifts along with appropriate waveforms. Cite some important applications of QPSK. | 5
(CO 4 & 5) |
| Q.5 | Obtain the Nyquist criterion for no ISI in pulse shaping problem. Choose any two analog sinusoidal signals, obtain their corresponding discrete time sequences and show the aliasing effect if not sampled at Nyquist rate. | 6
(CO 1 & 3) |