Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Electrical Engineering
(Applicable from the academic session 2018-2019)

Name of the course	COMMUNICATION ENGINEERING
Course Code: OE-EE-601B	Semester: 6th
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs/week	Mid Semester Exam: 15 Marks
Tutorial: 0 hr/week	Assignment & Quiz: 10 Marks
Credit Points: 3	Attendance: 05 Marks
	End Semester Exam: 70 Marks

Objective:	
1.	To understand the AM, FM and PM schemes with reference to SNR
2.	To understand the performance of ASK, FSK, PSK, BPSK, QPSK in a digital communication system
3.	To understand the source coding and channel coding schemes for a given communication link
4.	To understand the band width requirement and probability of error in various digital modulation systems
5.	To understand various digital modulation methods
6.	To solve numerical problems on the topics studied
Pre-Requisite	
1.	Analog Electronics (PC-EE 302)
2.	Digital Electronics (PC-EE 402)

Unit	Content	Hrs	Marks
1	**Elements of communication system:** The elements of a communication system, origin of noise and its effect, importance of SNR in system design. Basic principle of linear (AM) modulation, Generation of AM waves, Demodulation of AM wave. Basic principle of nonlinear (FM, PM) modulation. Generation of FM waves. Demodulation of FM waves. Sampling theorem, sampling rate, impulse sampling, reconstruction from samples, Aliasing. Analog pulse modulation-PAM (natural & flat topped sampling), PWM, PPM. Basic concept of Pulse code modulation, Block diagram of PCM, Multiplexing-TDM, FDM.	12	
2	**Digital transmission:** Concept of Quantization & Quantization error, Uniform quantizer, Non-uniform quantizer, A-law and μ -law. Encoding, coding efficiency. Line coding & properties, NRZ & RZ, AMI, Manchester coding, PCM, DPCM. Base band pulse transmission, Matched filter, error rate due to noise, ISI, Raised cosine function, Nyquist criterion for distortion-less base band binary transmission, Eye pattern, Signal power in binary digital signal.	08	
3	**Digital carrier modulation & demodulation technique:** Bit rate, Baud rate, Information capacity, Shanon's limit, M-ary encoding, Introduction to the different digital modulation techniques-ASK.FSK, PSK, BPSK, QPSK, mention of 8 BPSK, 16 BPSK.	10	

	Introduction to QAM, basic of 8 QAM, 16 QAM. Basic concept of Delta modulating, Adaptive delta modulation. Introduction to the concept DPCM. Basic concept of spread spectrum modulation.		
4	**Introduction to coding theory:** Introduction, News value & Information content, Entropy, Mutual information, Information rate, Shanon-Fano algorithm for encoding, Shanon's theorem-source coding theorem, Channel coding theorem, Information capacity theorem. Basic principle of Error control & coding.	08	

Text book:
1. An Introduction to Analog and Digital communication, Simon Haykin, Wiely India.
2. Analog communication system, P. Chakrabarti, Dhanpat Rai & Co.
3. Principle of digital communication, P. Chakrabarti, Dhanpat Rai & Co.
4. Modern Digital and Analog Communication systems, B.P. Lathi, Oxford university press

Reference books
1. Digital and Analog communication Systems, Leon W Couch II, Pearson Education Asia.
2. Communication Systems, A.B. Calson, Mc Graw Hill.
3. Communication Systems, R. Anand, Khanna Publications.

Course Outcome:

After completion of this course, the learners will be able to
1. compare the performance of AM, FM and PM schemes with reference to SNR
2. explain noise as a random process and its effect on communication receivers
3. evaluate the performance of ASK, FSK, PSK, BPSK, QPSK in a digital communication system
4. identify source coding and channel coding schemes for a given communication link
5. analyze various digital modulation methods
6. compute band width requirement and probability of error in various digital modulation systems

Special Remarks (if any)

The above-mentioned outcomes are not limited. Institute may redefine outcomes based their program educational objective.