



ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ  
ವಿಟಿಯು ಅಧಿನಿಯಮ ೧೯೯೪ರ ಅಡಿಯಲ್ಲಿ ಕರ್ನಾಟಕ ಸರ್ಕಾರದಿಂದ ಸ್ಥಾಪಿತವಾದ  
ರಾಜ್ಯವಿಶ್ವವಿದ್ಯಾಲಯ

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY**

State University of Government of Karnataka Established as per the VTU Act, 1994 "JnanaSangama" Belagavi-  
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DATE: 30 SEP 2024

## CIRCULAR

**Subject:** Instructions were added to the Experiments list of the BECL504 Digital Communication Lab regarding...

**Reference:** e-Mail from Chairperson BoS ECE/ETC VTU Belagavi dated 25.09.2024

Regarding the **BECL504-Digital Communication Lab**, please note the updated instructions for conducting hardware experiments:

"Hardware experiments can be conducted USING "FPGA-Based Software Defined Test & Measuring Instruments".

A revised syllabus copy is attached for reference. Principals, kindly inform concerned faculty and students about these updates.

Encl: Syllabus copy

Sd/-

REGISTRAR

To,

**All the Principals of Engineering Colleges under the ambit of the University**

Copy to

- The Hon'ble Vice-Chancellor through the secretary to VC for information
- The Registrar (Evaluation) for information and needful
- The Director, ITI,SMU,VTU Belagavi for information and needful also request to upload the circular on the University website
- The Special Officer QPDS section of VTU Belagavi for information and needful
- Office copy

  
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<b>Digital Communication Lab</b>		Semester	<b>5</b>
Course Code	<b>BECL504</b>	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Credits	01	Total SEE+CIE	100
		Exam Hours	2 Hours
Examination type (SEE)	<b>Practical</b>		
<b>Course objectives:</b>			
This laboratory course enables students to			
<ul style="list-style-type: none"> <li>• Design of basic digital modulation techniques using electronic hardware.</li> <li>• Simulation of vector computations and derive the orthonormal basis set using Gram Schmidt procedure.</li> <li>• Simulate the digital transmission and reception in AWGN channel</li> <li>• Simulate the digital modulations using software and display the signals and its vector representations.</li> <li>• Implement the source coding algorithms using a suitable software platform.</li> <li>• Simulate the channel coding techniques and perform decoding for error detection and correction.</li> </ul>			
<b>Sl.NO</b>	<b>Experiments</b>		
<b>Hardware Experiments can be conducted USING "FPGA BASED Software Defined Test &amp; Measuring Instruments</b>			
1	Generation and demodulation of the Amplitude Shift Keying signal.		
2	Generation and demodulation of the Phase Shift Keying signal.		
3	Generation and demodulation of the Frequency Shift Keying signal.		
4	Generation of DPSK signal and detection of data using DPSK transmitter and receiver.		
<b>Simulation Experiments (Use MUKU:GO / MATLAB / Scilab /LabVIEW or any other suitable software)</b>			
5	Gram-Schmidt Orthogonalization: To find orthogonal basis vectors for the given set of vectors and plot the orthonormal vectors.		
6	Simulation of binary baseband signals using a rectangular pulse and estimate the BER for AWGN channel using matched filter receiver.		
7	Perform the QPSK Modulation and demodulation. Display the signal and its constellation.		
8	Generate 16-QAM Modulation and obtain the QAM constellation.		
9	Encoding and Decoding of Huffman code.		
10	Encoding and Decoding of binary data using a Hamming code.		
11	For a given data, use the CRC-CCITT polynomial to obtain the CRC code. Verify for the cases, a) Without error b) With error		
12	Encoding and Decoding of Convolution code		

**Course outcomes (Course Skill Set):**

At the end of the course the student will be able to:

1. Design the basic digital modulation and demodulation circuits for different engineering applications.
2. Design of optimum communication receivers for AWGN channels.
3. Illustration of different digital modulations using the signals and its equivalent vector representations.
4. Implement the source coding and channel coding procedures using suitable software.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE):**

CIE marks for the practical course are **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

**Semester End Evaluation (SEE):**

- SEE marks for the practical course are 50 Marks.
- **SEE shall be conducted by the two examiners. One from the same institute as an internal examiner and another from a different institute as an external examiner, appointed by the university.**
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

**Suggested Learning Resources:**

1. B. P Lathi, Zhi Ding, "Modern Digital and Analog Communication Systems" 4<sup>th</sup> Edition, Oxford University Press, 2017, ISBJ:978-0-19-947628-2
2. Herbert Taub, Donald L Schilling, Goutam Saha, "Principles of Communication Systems", Mc Graw Hill Education, 2013, ISBN: 978-1-25-902985-1.