**Analog Communication lab**

**EC 591**

**Contact: 0L+0T+3P = 3**

**Credit: 2**

**Syllabus**

1. Measurement of modulation index of an AM signal.

1. Measurement of output power with varying modulation index an AM signal (for both DSB- & SSB).
2. Measurement of distortion of the demodulated output with varying modulation index of an AM signal (for both DSB-SC & SSB).

1. Measurement of power of different frequency components of a frequency modulated signal & the measurement of the bandwidth.
2. Design a PLL using VCO & to measure the lock frequency.
3. Design a FM demodulator using PLL.

1. Measurement of SNR of a RF amplifier.
2. Measurement of selectivity, sensitivity, fidelity of a super heterodyne receiver.
3. Study of waveforms of various functional points (output of RF, IF & video) of a B/W TV receiver.

10. Study of the vertical & horizontal sweep of the time base unit of a B/W TV.

11. One innovative experiment.

**New Experiments (Apart from the WBUT syllabus**)

1. Study of PAM and demodulation.
2. Study of Time Division Multiplexing and De- multiplexing Techniques.

**Course outcome:**

|  |  |
| --- | --- |
| CO | Statement |
| C01 | Understand the Analog Modulation techniques in term of modulation index, output power of DSB, SSB, FM and distortion of demodulated signal. |
| C02 | Design FM Modulator and Demodulator using VCO and PLL. |
| C03 | Understand the Modulation and Demodulation of PAM signal. |
| C04 | Analyze the Time Division Multiplexing and De-multiplexing techniques. |

**Mapping with CO with PSO**

|  |  |  |  |
| --- | --- | --- | --- |
|  | PSO1 | PSO2 | PSO3 |
| CO1 | 3 | 3 | 1 |
| CO2 | 3 | 2 | 1 |
| CO3 | 3 | 2 | 1 |
| CO4 | 3 | 2 | 2 |
| AVG OF EC591 | 4 | 2.25 | 1.25 |

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| --- | --- | --- | --- | --- |
| COs | Test-1 (T1)  (10) | Test-2 (T2) (10) | Test-3 (T3) (10) | Test-4 (T4) (10) |
| CO1 | Q1,Q2 | Q1 | Q1 | - |
| CO2 | Q3 | Q2,Q3 | Q2 | Q1 |
| CO3 | - | - | Q3 | Q2,Q3 |
| CO4 | Q4,Q5 | Q4,Q5 | Q4 | - |

Test-1: Configuration of circuit/writing of code

Test-2: Demonstration

Test-3: Report

Test-4: Viva

Accordingly prepare the above table for CO1, CO2, CO3 and CO4. Here average grading for CO1=2.9, CO2=2.9, CO3=2.9 and CO4=2.9

**CO attainment for a course EC 591:**

Target level 1: 60% students must score 60% and above

Target level 2: 70% students must score 60% and above

Target level 3: 80% students must score 60% and above

**Total number of student for the batch 2012-2016 in third year=144**

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| --- | --- | --- | --- | --- |
| Course outcome | Avg. grading on scale of 3 | Distribution % | | |
| 3 | 2 | 1 |
| CO1 | 2.9 | 134/144=93.05% | 10/144=6.9% | 0/144=0% |
| CO2 | 2.9 | 139/144=96.52% | 5/144=5.5% | 0/144=0% |
| CO3 | 2.9 | 131/144=90.97% | 13/144=9.02% | 0/144=0% |
| CO4 | 2.9 | 138/144=95.83% | 6/144=4.16% | 1/144=0.69% |

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| CO and PO Scale | 3 | Strongly Related |
| 2 | Moderately Related |
| 1 | Low |

**CO achieved if percentage (%) of students is greater than or equal to 60**

|  |  |  |
| --- | --- | --- |
| Course outcomes | % of students achieved CO | CO result (achieved) (Y/N) |
| CO1 | 93.05% | Y |
| CO2 | 96.52% | Y |
| CO3 | 90.97% | Y |
| CO4 | 95.83% | Y |

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| **CO** | **Statement** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| EC 591.1 | Understand the Analog Modulation techniques in term of modulation index, output power of DSB, SSB, FM and distortion of demodulated signal. | 3 | 3 | - | - | - | - | 2 | 2 | 1 | - | - | 2 |
| EC 591.2 | Design FM Modulator and Demodulator using VCO and PLL. | 3 | 3 | 3 | 3 | - | - | 2 | 2 | 1 | - | - | 2 |
| EC 591.3 | Understand the Modulation and Demodulation of PAM signal. | 3 | 3 | - | - | - | - | 2 | 2 | 1 | - | - | 2 |
| EC 591.4 | Analyze the Time Division Multiplexing and De-multiplexing techniques | 3 | 3 | - | - | - | - | 2 | 2 | 1 | - | - | 2 |
| EC 591 | | 3 | 3 | 3 | 3 | - | - | 2 | 2 | 1 | - | - | 2 |

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| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| EC 591 | 3 | 3 | 3 | 3 | - | - | 2 | 2 | 1 | - | - | 2 |

**Result of attainment of POs (CIE)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course | COs | CO Attainment | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| EC 591 | CO1 | 93.05% | 93.05% | 93.05% | 93.05%- | 93.05%-- | - | - | 62.03% | 62.03% | 31.01% | - | - | 62.05% |
| CO2 | 96.52% | 96.52% | 96.52% | 96.52% | 96.52% | - | - | 64.34% | 64.34% | 32.17% | - | - | 64.34% |
| CO3 | 90.97% | 90.97% | 90.97% | - | - | - | - | 60.64% | 60.64% | 30.32% |  |  | 60.64% |
| CO4 | 95.83% | 95.83% | 95.83% | - | - | - | - | 63.88% | 63.88% | 31.94% | - | - | 63.88% |
| AVG of EC 591 |  | 94.09% | 94.09% | 94.09% | 94.78% | 94.78% | - | - | 62.72% | 62.72% | 31.36% | - | - | 50.1% |

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| **PO attainment through (SEE)** | | | | | | | |  |  |  |  |  |  |  | |  |  |  |
| SL No | Course | | % of students achieved >=60% | | PO1 | | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | | PO9 | PO10 | PO11 | PO12 |
| 1 | EC591 | | 100% | | 100% | | 100% | 100% | 100% |  |  | 66.66% | 66.66% | | 33.33% |  |  | 66.66% |

**Mapping with CO with PSO**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | 3 | 2 | 1 |
| CO2 | 3 | 2 | 1 |
| CO3 | 3 | 2 | 1 |
| CO4 | 3 | 2 | 1 |
| CO5 | 3 | 2 | 1 |
| AVG OF EC 591 | 3 | 2 | 1 |

**Result of attainment of PSOs (CIE) (NB: The following table to be generated considering mapping of COs with PSOs)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course** | **COs** | **CO Attainment** | **PSO1** | **PSO2** | **PSO3** |
| EC 591 | CO1 | 100% | 100% | 66.66%% | 33.33% |
| CO2 | 100% | 100% | 66.66% | 33.33% |
| CO3 | 100% | 100% | 66.66%% | 33.33% |
| CO4 | 100% | 100% | 66.66%% | 33.33% |
| CO5 | 100% | 100% | 66.66% | 33.33% |
| AVG of EC 591 |  | 100% | 100% | 66.66% | 33.33% |

**Result of attainment of PSOs (SEE: Semester End Examination) (NB: The following table to be generated considering mapping of COs with PSOs)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SL No.** | **Course** | **% of students achieved >=60%** | **PSO1** | **PSO2** | **PSO3** |
| 1 | EC591 | 100% | 100% | 66.66% | 33.33% |