***Lesson Plan***

***Faculty :Prof.Jagruti Nagaonkar***

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| CLASS | | | | | | TE Electronics, Semester VI | | | |
| Academic Term | | | | | | Jan – April 2021 | | | |
| Subject | | | | | | **Signals and Systems (ELX 604)** | | | |
| ***Periods (Hours) per week*** | | | ***Lecture*** | | | | ***4*** | | |
| ***Practical*** | | | | ***--*** | | |
| ***Tutorial*** | | | | ***2*** | | |
| ***Evaluation System*** | | |  | | | | ***Hours*** | ***Marks*** | |
| Theory examination | | | | 3 | 80 | |
| Internal Assessment | | | | -- | 20 | |
| Practical Examination | | | | -- | -- | |
| Oral Examination | | | | -- | -- | |
| Term work | | | | -- | 25 | |
| Total | | | | -- | 125 | |
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| ***Time Table*** | | | ***Day*** | | | | ***Time*** | | |
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| ***Course Content and Lesson plan*** | | | | | | | | | |
| ***Module 1* Continuous And Discrete Time Signals** | | | | | | | | | |
|  | **Lecture No.** | **Date** | | | **Topic** | | | | **Remarks(If any)** |
| **Planned** | | **Actual** |
| 1 | 25.1.21 | |  | Introduction to Signals and Systems, Classification of CT and DT signals | | | |  |
| 2 | 27.1.21 | |  | Mathematical representation and arithmetic operations on the signals | | | |  |
| 3 | 29.1.21 | |  | Examples based on arithmetic operations on the signals | | | |  |
| 4 | 1.2.21 | |  | Transformation of independent variable for CT signals and problems on it | | | |  |
| 5 | 3.2.21 | |  | Transformation of independent variable for DT signals and problems on it | | | |  |
| 6 | 4.2.21 | |  | Mathematical representation and classification of CT and DT signal | | | |  |
|  | 7 | 5.2.21 | |  | Problems based energy and power of CT and DT signal | | | |  |
| 8 |  | |  | Problems based on periodicity of signals | | | |  |
| 9 |  | |  | Sampling and reconstruction, aliasing effect | | | |  |
| ***Module 2*  Continuous and Discrete system** | | | | | | | | | |
|  | 10 |  | |  | Mathematical representation and classification of CT and DT sytem | | | |  |
| 11 |  | |  | Problems based on classification of CT system | | | |  |
| 12 |  | |  | Problems based on classification of DT system | | | |  |
| 13 |  | |  | Use of convolution integral for analysis of LTI systems | | | |  |
| 14 |  | |  | Use of convolution sum for analysis of LTI systems | | | |  |
| 15 |  | |  | Problems based on convolution integral/sum. | | | |  |
| 16 |  | |  | Problems based on convolution integral/sum | | | |  |
| 17 |  | |  | Problems based on system properties in terms of impulse response | | | |  |
| 18 |  | |  | Problems based on system properties in terms of impulse response | | | |  |
| ***Module 3* Frequency Domain Analysis of Continuous Time System Using Laplace Transform** | | | | | | | | | |
|  | 19 |  | |  | Need of Laplace transform and review of Laplace transform | | | |  |
| 20 |  | |  | Properties of Laplace transform and inverse of Laplace transform, Concept of ROC and poles and zeros | | | |  |
| 21 |  | |  | Unilateral Laplace transform | | | |  |
| 22 |  | |  | Inverse Laplace Transform | | | |  |
| 23 |  | |  | Analysis and characterization of LTI system using Laplace transform: impulse and step response | | | |  |
| 24 |  | |  | causality, stability, stability of causal system | | | |  |
| ***Module 4* Frequency Domain Analysis of Discrete Time System Using Z Transform** | | | | | | | | | |  |
| 7 | 25 |  | |  | Need of Z transform and its definition, properties of unilateral and bilateral Z transform | | | |  |
| 26 |  | |  | mapping of Z transform with s plane, relationship with Laplace transform | | | |  |
|  | 27 |  | |  | Z transform of standard signals, ROC, poles and zeros of transfer function | | | |  |
| 28 |  | |  | inverse Z transform | | | |  |
| 29 |  | |  | Analysis and characterization of LTI system using Z transform: impulse response | | | |  |
| 30 |  | |  | Analysis and characterization of LTI system using Z transform: step response, causality, stability and stability of causal system | | | |  |
| 31 |  | |  | Problems on causality and stability | | | |  |
| 32 |  | |  | Problems on Block diagram representation , Problems on system realisation | | | |  |
| ***Module 5* Frequency Domain Analysis of Continuous Signals** | | | | | | | | | | 33 |
|  | 33 |  | |  | Frequency domain analysis of periodic non sinusoidal signal | | | |  |
| 34 |  | |  | Frequency domain analysis of aperiodic non sinusoidal signal | | | |  |
| 35 |  | |  | Properties of Fourier transform, | | | |  |
| 36 |  | |  | Fourier transform based on amplitude and phase response standard signal | | | |  |
| ***Module 6* Frequency Domain Analysis of Discrete Signals** | | | | | | | | | |
|  | 37 |  | |  | Discrete time Fourier series ,Evaluation of DTFS coefficient,Magnitude and phase spectrum | | | |  |
| 38 |  | |  | Concept of DTFT and numericals based on that | | | |  |
|  | 39 |  | |  | Numericals based on DTFT(Contd…) | | | |  |
| 40 |  | |  | Determination of magnitude and phase function using DTFT | | | |  |
| 41 |  | |  | Problems from university papers | | | |  |
| 42 |  | |  | Problems from university papers | | | |  |

**Recommended Books:**

1. Alan V. Oppenheim, Alan S. Willsky, and S. Hamid Nawab, “*Signals and Systems*”, 2nd

Edition, PHI learning, 2010.

1. Tarun Kumar Rawat, “*Signals and Systems*”, Oxford University *Press 2010.*
2. John Proakis and Dimitris Monolakis, “*Digital Signal Processing*”, Pearson Publication, 4th

Edition.



Two tests will be conducted which will cover at least 80% of syllabus. The average marks of both the tests will be considered as final IA marks



**Semester End Theory Examination**:

1.      Question paper will comprise of total 6 questions, each of 20 marks.

2.      Only 4 questions need to be solved.

3.      Question number 1 will be compulsory and will cover all modules.

4.      Remaining questions will be mixed in nature. (e.g.- suppose Q.2 has part (a)  from, module 3 then  part (b) will be from any module other than module 3.)

5.      In question paper weight age of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

6.      No question should be asked from pre-requisite module.

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| **Submitted By** | **Approved By** |
|  |  |
| Mrs. Jagruti Nagaonkar | ii) Prof. K. Narayanan Sign: |
| Sign: | ii) Prof. Sapna Prabhu Sign: |
|  | iii) Prof. Shilpa Patil Sign: |
|  | iv) Prof. Monica Khanore Sign: |
|  |  |
| **Date of Submission:** | **Date of Approval:** |
|  | |
| **Remarks by PAC (if any)** | |
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