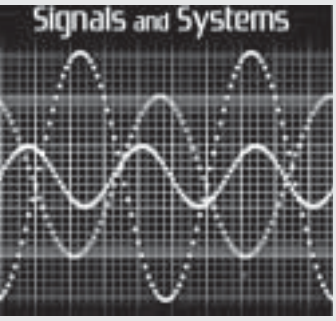

SOURCE:
http://engineering interviewquestions.com/ wp-content/uploads/ 2016/07/SIGNALS-and-SYSTEMS-LAB-VIVA-Questions-Answers.jpg

19EC202 SIGNALS AND SYSTEMS

Hours Per Week :

L	T	P	C
3	-	2	4

COURSE DESCRIPTION AND OBJECTIVES:

This course is about the fundamentals of continuous times signals and systems. The course objective is to cover the spectral analysis of periodic and aperiodic signals using Fourier series and Fourier transform. To analyze continuous time linear time invariant systems through Laplace transform and Fourier transform. To use simulation tools for transform analysis, convolution and to generate signals for understanding the behavior of signals and systems.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes.

COs	Course Outcomes
1	Understand the characteristics and properties of continuous time signals and systems.
2	Apply the concepts of convolution and correlation for continuous time signal.
3	Analyze the continuous time signals and systems in frequency domain using Fourier series, Fourier transform and Laplace transform.
4	Understand the effects of sampling of a continuous time signal.
5	Apply the techniques necessary for analysis of different CT signals and systems using modern engineering tools.

SKILLS:

- ✓ *Design and test a stable system.*
- ✓ *Choose the various transforms and their applications in the analysis of signals and systems.*
- ✓ *Apply transformation to real-world problems involving bio-signals such as EEG, ECG and EMG.*
- ✓ *Analyze the abnormalities present in the physiological systems.*
- ✓ *Choose the desired sampling frequency for a given application.*

UNIT - I **L-9**

FOURIER SERIES REPRESENTATION OF PERIODIC SIGNALS: Introduction to signals and systems, Basic signals, Classification, Operations; Vectors vs Signals, Orthogonal functions, Representation of signals using orthogonal functions, Mean square error, Representation of Fourier series, Continuous time periodic signals, Properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series, Exponential Fourier series, Complex Fourier spectrum.

UNIT - II **L-9**

TRANSFORMS:

FOURIER TRANSFORM (FT): Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, Properties of Fourier transforms, Fourier transforms involving impulse function and Signum function, Introduction to Hilbert Transform.

LAPLACE TRANSFORM (LT): Review of laplace transforms, Inverse laplace transform, Concept of region of convergence (ROC) for laplace transforms, Constraints on ROC for various classes of signals, Properties of LT's, Relation between LT and FT of a signal.

UNIT - III **L-9**

LTI SYSTEMS & ANALYSIS: Classification of Systems, Linear time invariant (LTI) system - impulse response, step response, response of a LTI system to arbitrary inputs, transfer function of LTI system; Filter characteristics of linear systems, Distortion less transmission, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between bandwidth and rise time.

UNIT - IV **L-9**

CONVOLUTION AND CORRELATION OF SIGNALS: Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Cross correlation and auto correlation of functions, Properties of correlation function, Energy density spectrum, Power density spectrum, Relation between auto correlation function and power spectral density, Relation between convolution and correlation.

UNIT - V **L-9**

SAMPLING: Sampling theorem, Graphical and analytical proof for band limited signals, Impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling - aliasing, introduction to band pass sampling.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS **TOTAL HOURS: 30**

1. Generation and plotting of trigonometric and exponential functions.
2. Standard signal generation (Impulse, Step, Ramp & Sinc).
3. Operations on signals (Folding, Shifting and Scaling).
4. Periodic and Non-periodic signal generation.
5. Analysis of periodic signals.
6. Analysis of Non-periodic signals.
7. Analysis of transfer function.
8. System analysis by using poles and zeros.
9. Sampling theorem verification.
10. System response.
11. Convolution of continuous time signals.
12. Correlation of continuous time signals.
13. Generation of random signals.

TEXT BOOKS:

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", 2nd edition, Prentice Hall of India, 1997.
2. B.P.Lathi, "Linear Systems and Signals", 2nd edition, Oxford University Press, 2009.

REFERENCE BOOKS :

1. B.P. Lathi, "Signals Systems & Communications", John Wiley, 2005.
2. Simon Haykin and Van Veen, "An Introduction to Signals & Systems", 2nd edition, Wiley, 2002.
3. John A.Stuller, "An Introduction to Signals & Systems", Thomson, 2008.
4. Kwei P.Hsu, "Signals & Systems", 3rd edition, McGraw-Hill, Schaum's Outlines, 2014.