COLLEGE OF ENGINEERING PERUMON

(Under Co operative Academy of Professional Education (CAPE), Estd. By Govt. of Kerala)

TEQIP II SPONSORED FACULTY DEVELOPMENT PROGRAMME

ON

"MATHEMATICAL PERSPECTIVE TOWARDS COMMUNICATION ENGINEERING"

29th July- 01st August 2019

Organized by

Department of Electronics and Communication Engineering

Co-ordinators

Prof. Surjith S

Prof.Jesna K A

(Assistant Professors, Department of ECE)

Day 1 (29/07/2019)

Session 1 (FN):

Resource Person: Dr.Sreeni K G, Assistant professor CET
Topic: Linear algebra

The program was inaugurated by the Principal Dr.Z A Zoya. Inauguration was followed by a Keynote address by the resource person by Prof. Dr. Sreeni K G,CET,Trivandrum.

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He discussed about the importance and application of linear algebra in communication system. Most mathematicians define Linear Algebra as that branch of mathematics that deals with the study of vectors, vector spaces and linear equations. Modern mathematics also relies upon linear transformations and systems of vector matrix. Analytic geometry utilizes the techniques learned during a study of linear algebra, for analytically computing complex geometrical shapes. In addition to science, engineering and mathematics, linear algebra has extensive applications in the natural as well as the social sciences. Linear algebra today has been extended to consider n-dimnsional space. Although it is very difficult to visualize vectors in n-space, such n-dimensional vectors are extremely useful in representing data.

Then he relies the application of eigen vectors in engineering design technology. Eigenvectors are extremely important while creating engineering models whether it be a satellite or a jet engine. He gave a brief introduction of eigenvectors and eigenvalues. Then he explained about how eigenvectors and eigenvalues are calculated. Then he presented a working example calculated the eigenvectors and eigenvalues

Session 2 (AN):

Resource Person: Mr.Nishanth N,A.P in ECE,TKM
Topic: Random variables and Random process

The resource person discussed about the fundamental of random variables. A random variable is a variable whose value is unknown or a function that assigns values to each of an experiment's outcomes. Random variables are often designated by letters and can be classified as discrete, which are variables that have specific values, or continuous, which are variables that can have any values within a continuous range. A random variable can be either discrete or continuous. Discrete random variables take on a countable number of distinct values. Continuous random variables can represent any value within a specified range or interval and can take on an infinite number of possible values. Then he discussed about the application of random variables in communication engineering.

The next session deals with random process. A random process (RP) (or stochastic process) is an infinite indexed collection of random variables $\{X(t) : t \in T\}$, defined over a common probability space. Then he discussed about the types of random process and various random process models

Day 2 (30/07/2019)

Session 1 (FN):

Resource Person: Birenjith P S,A.P in EC,GEC
Topic: Fourier transform and applications

The resource person started the session with the introduction of fourier transform. The Fourier transform is one of the most important operations in modern technology, and therefore in modern human civilization. The Fourier transform is a tool for solving physical problems. Then he talked about Fourier series, the Fourier transform of continuous and discrete signals and its properties. The he relies the usefulness of fourier transform in Convolutions and correlations and applications, probability distributions, sampling theory, filters, and analysis of linear systems.

The he gave us a brief description of the discrete Fourier transform and the FFT algorithm, multidimensional Fourier transform and use in imaging. He discussed about further applications of FT to optics, crystallography.

Session 2 (AN):

Resource Person: Dr. R Bijukumar,Professor& HOD in ECE,CE Perumon

Topic: Coding in communication

The resource person started the session with the introduction of general block of digital information system. Then he talk about Channel coding in detail. Channel coding, also known as forward error control coding (FECC), is a process of detecting and correcting bit errors in digital communication systems. Channel coding is performed both at the transmitter and at the receiver. At the transmit side, channel coding is referred to as encoder, where extra bits (parity bits) are added with the raw data before modulation. At the receive side, channel coding is referred to as the decoder. Channel coding enables the receiver to detect and correct errors, if they occur during transmission due to noise, interference and fading.coding theory is basically divided into two major types of codes. Linear block codes and Convolutional codes. Linear block codes have the property of linearity, i.e. the sum of any two codewords is also a code word, and they are applied to the source bits in blocks, hence the name linear block codes. Then he discussed about cyclic codes. The idea behind a convolutional code is to make every codeword symbol be the weighted sum of the various input message symbols. This is

like convolution used in LTI systems to find the output of a system, when you know the input and impulse response. Then he discussed about convolutional decoding algorithm viterbi.

Day 3 (01/08/2019)

Session 1 (FN):

Resource Person: Mr.Nishanth N,A.P in ECE,TKM
Topic: Queueing theory

He discussed about the queuing theory in telecommunication networks. **Queueing theory** is the mathematical study of waiting lines, or queues. A queueing model is constructed so that queue lengths and waiting time can be predicted. Queuing theory is generally considered a branch of operations research because the results are often used when making business decisions about the resources needed to provide a service. Then he talked about the various scheduling mechanisms in queuing theory. Networks of queues are systems in which a number of queues are connected by what's known as customer routing. When a customer is serviced at one node it can join another node and queue for service, or leave the network. Then he gave a real time analysis of a MM1 queue.

The Faculty Development programme concluded with a valedictory function presided by the Head of the dept Dr.RBijukumar. In the valedictory function, certificates were distributed to the participants from other Engg.colleges

Conclusion

The whole week of the information-packed Faculty Development Program was undoubtedly a space for gaining better understanding of the concerned subjects. It has promoted professional development in every aspect, in addition to improving various skills that resonates with the faculty's individual goals, strategic priorities as well as departmental and institutional missions.