A Report

On

Two Weeks Orientation Programme in Mathematics for Direct Second Year Engineering Students under TEQIP-III during Sep 12-23, 2017

Department of Mathematics organized a Two Weeks Orientation Programme in Mathematics for Direct Second Year Engineering Students under TEQIP-III during Sep 12-23, 2017. Prof Raju from IIT Ropar, Dr.D.D.Pawar and Prof. Darkunde Nitin from SRTM University, Nanded were the resource persons in this course. Faculties of Mathematics department also took lectures in this course. Following were the main objectives of this course:

1. To improve mathematical background required for engineering education.
2. To make the students aware about applications of mathematics in different engineering.
3. To develop interest in Mathematics among the direct second year engineering and remove math phobia.
4. To acquire a wide range of abilities and skills in learning mathematics enthusiastically.

Day:1

Course was inaugurated by the auspicious presence and speech of Dr. L. M. Waghmare, Director SGGS IE & T, Nanded. Prof. Subhash Birajdar, welcomed all the dignitaries by offering a book and flower. Dr. Arunkumar R. Patil, Head, Department of Mathematics gave a brief idea about this orientation program.

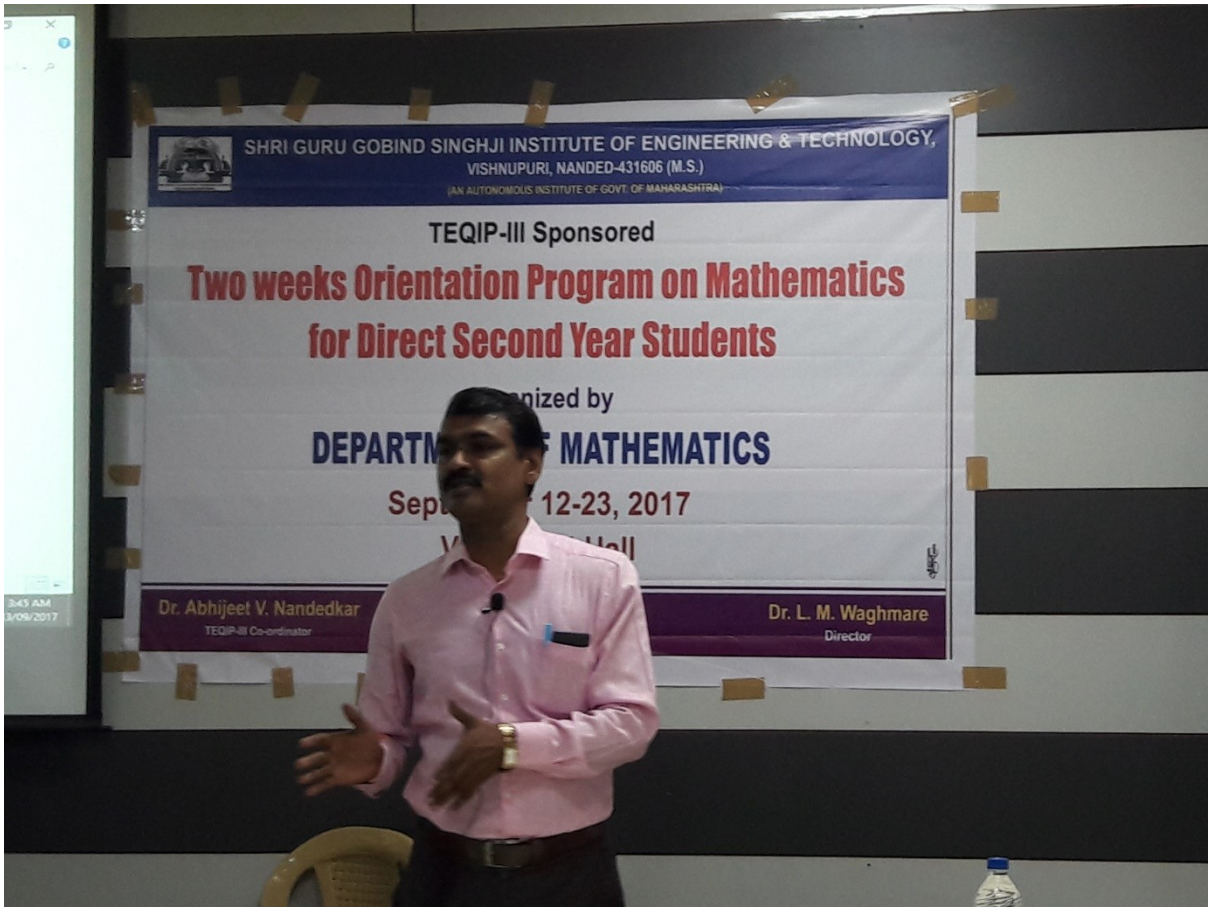
Prof. S.M Birajdar started his talk on basics of engineering mathematics. As the course is only for the Direct second year students, so he gave them brief introduction about the engineering mathematics of first year course. He taught the real line and its properties. He explained the algebraic and order properties of real numbers and using them how to solve the inequalities.

Prof.D.D.Pawar started his first talk immediately after the inauguration formalities. His talk was on Unity of Mathematics. In his talk he explained, what Euclidean Geometry is. By taking many examples he explained it in a very interesting manner .He took many real life examples to explain the Riemannian geometry and Euclidean geometry. He mentioned why we need the Riemannian geometry for practical purpose.

Day:2

On Second day, first lecture was conducted by Prof.S.M.Birajdar. He took the existence and uniqueness theorem for second order differential equation and explained it briefly. He took many examples to demonstrate the theorem. He explained how to find the longest interval for the uniqueness of given second order linear differential equation. He also described the Wronskian determinant and its properties. By using the concept he explained whether the set of solution is linearly independent or not.

The second lecture was conducted by Dr.D.D.Pawar. In this lecture he introduced the different concepts for measuring the distance. He talked on the concept of “Black hole”. He discussed the concept of “Bermuda Triangle” using Riemannian geometry. He explained the limitations of Euclidean Geometry too.



Day:3

On the third day of the programme both the sessions are conducted by Mr.Ram Dillipat. In his lecture he defined what is meant by function, he explained how to find domain of definition, range of a function. He also mentioned the types of the functions and the properties to identify the given function.

While explaining the concept of function immediately he explained the limit and continuity of a function. He revealed how function becomes discontinuous and what are the types of discontinuities. Meanwhile in limit concept he coined the terms left hand limit and right hand limit and explained its importance by taking some examples.

Day:4

The fourth day sessions were conducted by Dr. Basude Sachin. He taught Derivative and its applications. He defined the term derivative and differentiable function. He took the definition in various forms e.g.: left hand derivative, right hand derivative, derivative at a point etc. Using these concepts he demonstrated the relationship between the differentiable function and the continuous function. He took some examples of the general derivative formulae .He also took the examples in which functions are continuous but not differentiable.

In his next session he talked on the applications of derivative. He explained how to find out maxima, minima and what critical point is. As an application of derivative he explained the most important theorems of calculus that are Mean Value Theorem and Rolle`s theorem. As an application of these theorems he showed how to predict the roots of polynomials.

Day:5

As a resource person fifth day`s lectures were conducted by Prof. Raju from IIT Ropar. In his lecture he taught linear algebra. He started his talk from the definition of vector spaces. He explained vector spaces in brief and talk about some examples. After that he explained about subspaces.

Later he discussed system of linear equations and its solution set. He talked about the solution of system , and explained when solution set becomes a subspace. He discussed the concept of row echelon form, and used it to find the solution space.
Later he discussed the famous rank nullity theorem, and applied it for finding solution space.

Day:6

All the sessions of sixth day are also conducted by Prof. Raju. On this day he discussed about basis of the vector spaces. He discussed the concept of linearly dependent and independent set. He introduced the concept of diagonalization. He defined Eigen values and Eigen vectors.

He introduced the term inner product space and discussed the properties of inner product space. By using inner product space he discussed about the concept of Gram-Schmidt orthogonalization process. He discussed many examples, and gave worksheets to the students to solve it.

Day:7

On seventh day the lectures were taken by Miss.Jaya Chavan on the algebraic structures. She defined the modulus function and explained its properties and graph. She also introduced some standard notations like “Pi” and “Sigma” etc. She took many algebraic structures and explained its properties.

In her talk, she mentioned the partial fraction method which is used as tool in solving many mathematical problems in engineering. She introduced some basic inequalities like “Cauchy-Schwarz inequality”, “Triangle inequality” which has many applications.

Day:8

Prof. Darkunde Nitin S was the resource person for this day. He taught “Function of Complex variables”. He began his lecture with the introduction to the complex number system and mentioned why we need complex number system. After defining the complex number he took the definition of conjugation and modulus of complex numbers, and proved their basic inequalities and properties. He also showed the geometrical representation of a complex numbers and stated the well- known “De-Moiver’s theorem”.

Using the “D-Moiver’s ” theorem he found the n^{th} roots of complex numbers. He expressed the equation of circle and straight line in terms of a complex number and it’s conjugate. On all of these topics he took many examples and inspired students to solve the problems by themselves .At the end of the session he defined what the function of complex variables is and worked out on some examples.

Day: 9

On ninth day of the Orientation programme the lectures were conducted by Mr.Nitesh Ghungarwar. In his first session he taught different types of functions like algebraic and transcendental. He also described polynomial functions, rational functions, irrational functions, piecewise continuous functions, trigonometric functions exponential functions and logarithmic functions.

In his next session he taught how to plot the graph of all the functions which were taught in the previous session. He introduced the different trigonometric formulae. He explained XY-coordinate system and the role of quadrants in trigonometric formulae.

Day: 10

“First order differential equation” was taught by Miss. Syed Z.M. She started her lecture by the introduction to the differential equation. She defined the ordinary differential equation and the partial differential equation, solution of differential equation, initial valued problem. She also introduced the definitions of order and degree of differential equation, and mentioned the difference between the linear and the non-linear differential equation.

In the second session, the speaker introduced the formation of exact differential equation and demonstrated it by using some functions. After formation immediately, she gave the method to solve the exact differential equation and for practice of students she took some exercises.

Day: 11

The session is started from the discussion of initial value problem by Miss. Syed Z.M. She took initial value problem for exact differential equation. There are many differential equations which are non-exact to solve those equations she proved the theorem and mentioned the formulae to find out the integrating factor. Then she discussed method to convert a non-exact equation into exact differential equation.

Corresponding to non-exact equation she took initial value problems and solved it. After completing the exact and non-exact differential equation, the speaker introduced the linear differential equation. The solution of linear differential equation was discussed by her. At the end of the session she took the initial value problems on linear differential equation.

Day: 12

Miss. Syed Z.M defined the non-linear differential equation. She mentioned one special kind of non-linear equation i.e. “Bernoulli’s” equation and discussed the method to solve the Bernoulli’s equation.

In the second session, she explained some of the applications of linear differential equations. She discussed, for a given family of curves how to find the orthogonal trajectories .Lastly, she explained the mathematical models for “LR Circuit” and “CR Circuit”.

The third session of the day was taken by Mr.Ram Dillipat. He discussed homogeneous second order differential equation with constant coefficients. He explained method to find the general solution of equation. Also he took initial value problem and discussed the sketching of solution curves.

Mr.Ram Dillipat discussed the theory behind the second order linear differential equation .He stated and proved the principle of superposition. He also discussed fundamental set of solutions.

Finally, at the end of the course many students gave the feedback and the course was ended by the vote of thanks by Mr.Ram Dillipat.