MATHEMATICS MODULES

(For AICTE Approved Colleges)

Prepared by

Department of Mathematical Sciences

Indian Institute of Technology

(Banaras Hindu University)

Varanasi – 221005

Preface

The genesis of this module lies in the Induction Program first conceived and started by IIT(BHU) on 2016 on mass scale for about 1000 students. The fact is that the students are overburdened and stressed out due to a hectic high school life. To refresh their creative mind, they were exposed to month long diverse credit courses like Physical Education, Human Values and Creative Practices, as well as several non-credit informal activities. In a welcome step the AICTE has proposed to extend this program to the Engineering Colleges affiliated to them.

In fact, purpose of this module is to bridge the gap between what the students need to know before they can start taking the advanced courses in the college level and what they are actually aware of from the intermediate level. Consequently, after the completion of the 3-weeks induction program, it is proposed that (besides other subjects) bridge courses in basic Physics, Chemistry and Mathematics should be taught to these students for the rest of the semester. The bridge courses will cover typical weaknesses of students in science at the 10+2 level.

The modules in Mathematics are prepared keeping in mind that an hour of discussion will bring all the students in the same stage such that they can cope up with the courses in their college level, that requires the concepts of different topics in Mathematics. The modules are made as interactive sessions between the students and the instructors. Furthermore, we have discussed those topics which harder to understand. At the end of the discussion teacher may also take a small test to understand how much the students followed the class.

In brief the contents of the modules are presented as follows. In Module-1, basic concepts of sets, relations and function are discussed. Module -2 describes the definition of limit and discuss some of its properties. After that we introduce the notion of continuity of a function and the concept of the derivative of a function, and their properties.

Module-3 presents the idea of the basics of matrices, types of matrices, operations on matrices, determinants and cofactors, computing inverse of a square matrix, rank and elementary operations with brief discussion on system of linear equations.

Module-4 introduces the idea of the complex numbers and its basic properties. Further, the definition of the complex sets, neighbourhood of a complex number, domain, complex functions, limit of a complex functions and continuity of complex functions are presented in detail with several examples.

Module-5 is devoted to the differential equations and includes the topics as the formation of the differential equations, some special forms of the differential equations and then existence and uniqueness of the first order differential equations. Module-6 focuses on the double and triple integral and describes the method to solve such problems. It includes the other topics as polar equations of conics, directional derivatives, gradients, divergence and curl. Module-7, 8 and 9 presents the basic idea of the trigonometry, probability and statistics respectively.

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This is to mention that that modules are prepared for the students with an objective to create interest among them in the subject. The references used in preparing these modules are cited at end of each module.

Department of Mathematical Sciences,

IIT(BHU), Varanasi

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Contents

Note: The concepts should be explained through engineering problems.