BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus

In addition to Part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No.          : **MATH C441/MATH F441**
Course Title        : **Discrete Mathematical Structures**
Instructor-in-charge : **TRILOK MATHUR**

**1.Scope and Objective of the course:**
The objective is to present and discuss some method of discrete mathematics and some discrete mathematical structures at graduate level. One part deals with some functions and techniques of discrete nature used in design and analysis of algorithms and the other part deals with Combinatorial Structures and algorithm. (Since there is a separate course offered on Graph theory, graphical structures are not discussed in detail)

**2. Text Books:**

1) *Lindsay Childs,* **A Concrete Introduction to Higher Algebra-2e, Springer-Verlag, 1979.**

2) *V. Krishnamurthy***, Combinatorics, Theory and Applications, East-West Press, 1985.**

**Reference Books:**

**(1)** *Graham, Ronald and others***, Concrete Mathematics, Addison-Wesley, 1990.**

**(2)** *R. Lide and H. Niederreiter,* **Introduction to finite fields & their applications, Cambridge University Press, 1986.**

**3. Course Plan:** (Sections/Articles refer to Text-Book)

| Lect No. | Learning Objectives | Topic | Chapters | Book |
|---|---|---|---|---|
| 1-4 | Introduction to Groups | Definition and examples of groups. $\mathbf{Z}_n$ and Permutation group $S_n$, | 9-E, 11-A,B 8-A,B 2 (Part-IV) | T-1 T-1 T-2 |
| 5-8 | Introduction to the number theory | Euler's φ function, Euler's theorem and Mobiöus function μ, The Legendre symbol | 9-C 30-E 27-B | T-1 T-1 T-1 |

| 9-12 | The Chinese remainder theorem (CRT) | CRT for integers<br>CRT for polynomials<br>Application of CRT to fast polynomial multiplication | 12-A,C<br>20<br>21-B | T-1 |
|---|---|---|---|---|
| 13-16 | Introduction to the theory of finite fields. | Construction of finite fields and simple field extension | 28-A,B<br>30-C | T-1 |
| 17-24 | Introduction to the coding theory | Secret Codes, Error correcting codes and Reed-Solomon codes | 7-F, 10-B, 13-E, 13-F, 29-B,C | T-1 |
| 25-26 | Factoring in $Q[x]$ | Eisenstein's criteria for Irreducibility | 18 | T-1 |
| 27-29 | Factoring in $Z_p[x]$ | Berelekamp's algorithm | 22-A, 30-B | T-1 |
| 30-32 | Introduction to advanced method of computing | Generating functions and Recurrence relations | 2 (Part-I) | T-2 |
| 33-35 | | Polya's theory of enumeration | 3 (Part-II) | T-2 |
| 36-40 | Introduction to Design | Block design<br>Latin square and<br>Hadamard matrix | Part-VIII<br>29-A<br>Part-VIII | T-2<br>T-1<br>T-2 |

**4. Evaluation Scheme:**

| EC No. | Evaluation Component | Duration | Weightage (in %) | Date & Time | Nature of Component |
|---|---|---|---|---|---|
| 1. | Mid-Term Test | 90 Min. | 35 | 8/10 8:00 - 9:30 AM | Close Book |
| 2. | Comprehensive Exam. | 3 Hrs. | 45 | 8/12 FN | Partially Open Book |
| 3. | Announced /Surprise Quiz | 20 Min. | 20 | | Close Book |

**5. Make-up:** Make-up will be given only in genuine cases.

**6. Chamber consultation hour:** To be announced in the class.

**7. Notices:** All notices regarding MATH F441/MATH C441 will be put on NALANDA website.

**Instructor-In-Charge**
**MATH F441/ MATH C441**