INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

Proposal for introducing a new subject

1	Name of the Department	Mathematics
2	Name of the Subject	Galois Theory
3	LTP and Credit	3+1+0 (4 credit)
4	Status of the subject	
	(a) Specify the Session, Semester, from which the subject is going to be offered	Autumn 2015-2016
	(b) Please Specify the Level of the Subject	B. Tech, M.Sc, Integrated M.Sc, Ph. D.
	(c) Whether the subject will be offered as compulsory or elective	Elective
	(d) The semester in which the subject will be offered	Autumn
	(e) Name(s) of the Programme(s) in whose curricula this subject will be included	(1) 3rd semester of 2 year M.Sc. (2) 7th semester of 5 year integrated M.Sc. (3) Research scholars (4) 4th year of B.Tech
5	Prerequisite(s) for the subject, if any (Please give the subject numbers and names)	(1) Linear Algebra (MA30103) (2) Modern Algebra (MA41002)
6	Objective and Contents	
	(a) Objective	To study the solvability of polynomials by using the Galois groups. This course will be compulsory to students who would like to specialize or pursue research in the field of pure mathematics (for example: Commutative Algebra, Algebraic Geometry, Number theory, Representation theory).
	(b) Contents (in 100 to 150 words)	Fields, Characteristic and prime subfields, Field extensions, finite, algebraic and finitely generated field extensions, Classical ruler and compass constructions, Splitting fields, transcendental, separable, normal purely inseparable extensions, algebraic closures. Finite fields, Cyclotomic fields, perfect fields, theorem of the primitive element. Galois groups, Fundamental Theorem of finite Galois Theory, Composite extensions, Examples (including cyclotomic extensions and extensions of finite fields), Cyclic extensions, determining the Galois group of a polynomial, solvability by radicals,

		Kummer theory. Transcendental extensions.
7	Names of the faculty members of the Department/Centers/School who have the necessary expertise and will be the willing to teach the subject (Minimum two faculty members should be willing to teach the subject)	(1) Dr. Ramakrishna Nanduri (Mathematics) (2) Dr. Bappaditya Bhowmik (Mathematics)
8	Do the contents of the subject have an overlap with any other subject offered in the Institute?	No
9	Recommended Text books/References	
	a) Theory (Text Books)	[1] M. Artin, Algebra, Prentice Hall of India, 1994. [2] N. Jacobson, Basic Algebra I, 2nd Edition, Hindustan Publishing Co., 1984, W.H. Freeman, 1985. [3] D.S. Dummit and R. M. Foote, Abstract Algebra, 2nd Edition, John Wiley, 2002.
	b) References (Literature)	[1] J.A. Gallian, Contemporary Abstract Algebra, 4th Edition, Narosa, 1999. [2] Lang, Serge, Algebra, revised third edition, Graduate Texts in Mathematics, 211, Springer-Verlag, New York, 2002.
10	Names of Departments/Centers/Schools/Programmes whose students are expected to register for this subject	Mathematics, CSE, ECE, EE, PHY

Lecture-wise Topics:

Number of Lectures	Topics
2 Lectures	Fields, Characteristic and prime subfields, Field extensions, finite, algebraic and finitely generated field extensions
2 Lectures	Classical ruler and compass constructions
2 Lectures	Splitting fields
5 Lectures	transcendental, separable, normal, purely inseparable extensions
1 Lecture	algebraic closures
4 Lectures	Finite fields, Cyclotomic fields, perfect fields, theorem of the primitive element
6 Lectures	Galois groups, Fundamental Theorem of finite

	Galois Theory
4 Lectures	Composite extensions, Examples (including cyclotomic extensions and extensions of finite fields)
5 Lectures	determining the Galois group of a polynomial
4 Lectures	solvability by radicals, Kummer theory
1 Lecture	Transcendental extensions

Total : 36 Lectures
and 10 Tutorials.