1) **Proposed Curriculum for CSE BTech Program for 2013 Batch onwards**

2) **Proposals for minor changes in existing courses without syllabus changes**

3) **Proposal for four new courses, of which one is completely new and other three are update of existing syllabus and credit structures**

1) COMPUTER SCIENCE & ENGINEERING
COURSE CURRICULUM FOR THE NEW PROGRAMME (B.Tech) w.e.f. 2013 BATCH

Component	**Credits**
Basic Sciences	62
Engineering Sciences and Skills	29
HSS	12
Institute Electives	12
Departmental courses:	153
	117
Core	36
Electives	
Total	**268**

2)

Semester I						Semester – II					
Course code	**Course Name**	**Credit Structure**				**Course Code**	**Course Name**	**Credit Structure**			
		L	**T**	**P**	**C**			**L**	**T**	**P**	**C**
CH 105	Organic & Inorganic Chemistry	**1.5**	**.5**	**0**	**4**	BB 101	Biology	**3**	**0**	**0**	**6**
CH 107	Physical Chemistry	**1.5**	**.5**	**0**	**4**	CH 117	Chemistry Lab.	**0**	**0**	**3**	**3**
CS 101	Computer Programming and Utilization	**2**	**0**	**2**	**6**	CS 152	Abstractions and Paradigms in Programming (DIC)	**3**	**0**	**0**	**6**
MA 105	Calculus	**3**	**1**	**0**	**8**	CS 154	Abstractions and Paradigms in Programming Lab	**0**	**0**	**3**	**3**
ME 119	Engineering Graphics and Drawing	**1**	**0**	**3**	**5**	MA 106 And MA 108	Linear Algebra and Ordinary Differential Equations I	**3**	**1**	**0**	**8**
PH 107	Quantum Physics and application	**2**	**1**	**0**	**6**	ME 113	Workshop Practice	**0**	**0**	**4**	**4**
PH 117	Physics Lab	**0**	**0**	**3**	**3**	PH 103	Electricity and Magnetism	**3**	**0**	**0**	**6**
Total					**36**	**Total**					**36**

Semester III						Semester –IV					
Course code	**Course Name**	**Credit Structure**				**Course Code**	**Course Name**	**Credit Structure**			
		L	**T**	**P**	**C**			**L**	**T**	**P**	**C**
CS 251	Software Systems Lab	**1**	**3**	**0**	**8**	CS 226	Digital Logic Design	**3**	**0**	**0**	**6**
CS 207	Discrete Structures	**3**	**0**	**0**	**6**	CS 254	Digital Logic Design Lab	**0**	**0**	**3**	**3**
CS 213	Data Structures and Algorithms	**3**	**0**	**0**	**6**	CS 218	Design and Analysis of Algorithms	**3**	**0**	**0**	**6**
CS 293	Data Structures and Algorithms Lab	**0**	**0**	**3**	**3**	CS 228	Logic for Computer Science	**3**	**0**	**0**	**6**
CS 215	Data Analysis and Interpretation	**3**	**0**	**0**	**6**	CS 224	Computer Networks	**3**	**0**	**0**	**6**
EE 101	Introduction to Electrical and Electronic Circuits	**3**	**1**	**0**	**8**	CS 252	Computer Networks Lab	**0**	**0**	**3**	**3**
						*HS 101	Economics	**3**	**0**	**0**	**6**
Total					**37**	**Total**					**36**

***: The placement shown assumes that HS101 will be offered in 4th semester also. If it is offered in 3rd semester only then it will be swapped with the corresponding CS course.**
!: Current name for these course is Logic Design and Logic Design Lab. A proposal has been made for the name change.

Semester V						Semester –VI					
Course code	**Course Name**	**Credit Structure**				**Course Code**	**Course Name**	**Credit Structure**			
		L	**T**	**P**	**C**			**L**	**T**	**P**	**C**
CS 305	Computer Architecture	**3**	**0**	**0**	**6**	*CS 3XX	Automata Theory	**3**	**0**	**0**	**6**
CS 341	Computer Architecture Lab	**0**	**0**	**3**	**3**	CS 302	Implementation of Programming Languages	**3**	**1**	**0**	**8**
CS 317	Database and Information Systems	**3**	**0**	**0**	**6**	!CS 306	Implementation of Programming Languages Lab	**0**	**1**	**2**	**4**
CS 387	Database and Information Systems Lab	**0**	**0**	**3**	**3**	CS 344	Artificial Intelligence	**3**	**0**	**0**	**6**
CS 347	Operating Systems	**3**	**0**	**0**	**6**	CS 386	Artificial Intelligence Lab	**0**	**0**	**3**	**3**
!CS 377	Operating Systems Lab	**0**	**1**	**2**	**4**	MA 214	Numerical Analysis	**3**	**1**	**0**	**8**
HS 301	Literature/Philosophy/Psychology /Sociology	**3**	**0**	**0**	**6**						
Total					**34**	**Total**					**35**

***: To be replaced with a 3xx number.**
!: Proposal for change in credit structure is included.

Semester VII						Semester –VIII					
Course code	**Course Name**	**Credit Structure**				**Course Code**	**Course Name**	**Credit Structure**			
		L	**T**	**P**	**C**			**L**	**T**	**P**	**C**
	Elective 1	**3**	**0**	**0**	**6**		Elective 4	**3**	**0**	**0**	**6**
	Elective 2	**3**	**0**	**0**	**6**		Elective 5	**3**	**0**	**0**	**6**
	Elective 3	**3**	**0**	**0**	**6**		Elective 6	**3**	**0**	**0**	**6**
	Institute Elective 1	**3**	**0**	**0**	**6**		Institute Elective 2	**3**	**0**	**0**	**6**
ES200/ HS200	Environmental Studies	**3**	**0**	**0**	**6**						
Total					**30**	Total					**24**

2) Proposals for minor changes in existing courses without syllabus changes:

2.a. It is proposed to change the name of CS 210 – ‘Logic Design’ to ‘Digital Logic Design’ to better reflect the course contents and to distinguish it from ‘Mathematical Logic’.

2.b. It is proposed to change the names of CS288 – ‘Logic Design Lab’ to ‘Digital Logic Design Lab’.

2.c. It is proposed that the credit structure for CS 377 (OS lab) should be changed to 0-1-2-4, from the current 0-0-3-3. That is, the overall number of contact hours remains the same, but one contact hour is deemed as a tutorial hour, requiring student effort beyond the contact hour.

2.d. It is proposed that the credit structure for CS 306 (PL lab) should be changed to 0-1-2-4, from the current 0-0-3-3. That is, the overall number of contact hours remains the same, but one contact hour is deemed as a tutorial hour, requiring student effort beyond the contact hour.

3). Proposal for four new courses, of which one is completely new and other three are update of existing syllabus and credit structure.

3.a). Proposal for a 8 credit Software Systems Lab

Name of Academic Unit (Department /School/ Centre/ ID Group) : CSE

Preamble to the proposal (optional) : 2nd year core course. Should have 2xx number.

Level : Undergraduate

Programme : B.Tech

i	**Title** of the course	Software Systems Lab
ii	Credit Structure (**L-T-P-C**)	1-3-0-8
iii	**Type** of Course (Institute/ Departmental) + (Core/ Elective/ ...)	UG Core
iv	Semester in which normally to be offered (**Autumn/Spring**)	Autumn
v	Whether **Full or Half Semester** Course	Full
vi	**Pre-requisite(s)**, if any (For the students) – *specify course number(s)*	CS101
vii	Course **Content** *	1. Vim/emacs HTML, CSS 2. Report and presentation software: latex, beamer, drawing software (e.g. inkscape, xfig, open-office) 3. IDE (e.g. eclipse, netbeans), code reading, debugging Basic Java Java collections, interfaces 4. Java threads Java GUI Introduction to documentation: e.g. doxygen/javadocs 5. Version management: SVN/Git 6. Unix basics: shell, file system, permissions, process hierarchy, process monitoring, ssh, rsync 7. Unix tools: e.g. awk, sed, grep, find, head, tail, tar, cut, sort 8. Bash scripting: I/O redirection, pipes 9. Python programming 10. Makefile, libraries and linking 11. Graph plotting software (e.g., gnuplot) 12. Profiling tools (e.g., gprof, prof) 13. Optional topics (may be specific to individual

		students' projects): intro to sockets, basic SQL for data storage, JDBC/pygresql A project would be included which touches upon many of the above topics, helping students see the connect across seemingly disparate topics. The project is also expected to be a significant load: 20-30 hours of work.
viii	**Texts/References** **	Online tutorials for HTML/CSS, Inkscape, OODraw Unix Man Pages for all unix tools, Advanced Bash Scripting Guide from the Linux Documentation Project (www.tldp.org) The Python Tutorial Online Book (http://docs.python.org/3/tutorial/index.html) The Java Tutorials (http://docs.oracle.com/javase/tutorial/) Latex - A document preparation system, Leslie Lamport, 2/e, Addison-Wesley, 1994
ix	Name(s) of **Instructor(s)** ***	Bhaskaran Raman, Parag Chaudhuri
x	Name(s) of **other Departments/ Academic Units to whom** the course is **relevant**	
xi	Is/Are there any course(s) in the same/ other academic unit(s) which is/ are **equivalent** to this course? If so, please give details.	No (this is a replacement for current 6 credit CS 296, which also has the same name, but we would like a fresh number since the credit structure has changed).
xii	**Justification/ Need** for introducing the course	This is really an update of syllabus and credits of an existing course, but we would like a fresh course number since credits have changed and the old course will run at least one more time.

3.b). Proposals for a new courses ‘Data Analysis and Interpretation’

Name of Academic Unit (Department /School/ Centre/ ID Group) : CSE

Preamble to the proposal (optional) : 2nd year core course. Should have 2xx number.

Level : Undergraduate

Programme : B.Tech

i	**Title** of the course	Data Analysis and Interpretation
ii	Credit Structure (**L-T-P-C**)	3-0-0-6
iii	**Type** of Course (Institute/ Departmental) + (Core/ Elective/ ...)	UG Core
iv	Semester in which normally to be offered (**Autumn/Spring**)	Autumn
v	Whether **Full or Half Semester** Course	Full
vi	**Pre-requisite(s)**, if any (For the students) – *specify course number(s)*	CS101
vii	Course **Content** *	The role of statisitcs. Graphical and numerical methods for describing and summarising data. Probability. Population distributions. Sampling variability and sampling distributions. Estimation using a single sample. Hypothesis testing a single sample. Comparing two populations or treatments. Simple linear regression and correlation. Case studies.
viii	**Texts/References** **	Introduction to Probability and Statistics for Engineers and Scientists by Sheldon M. Ross, Elsevier, New Delhi, 3rd edition (Indian). Probability, Random Variables and Stochastic processes by Papoulis and Pillai, 4th Edition, Tata McGraw Hill. An Introduction to Probability Theory and Its Applications, Vol. 1, William Feller, 3rd edition, Wiley International
ix	Name(s) of **Instructor(s)** ***	M. Sohoni, Ganesh R.
x	Name(s) of **other Departments/ Academic Units to whom** the course is **relevant**	All. Once it was an institute core course.
xi	Is/Are there any course(s) in the same/	Not unless other departments are choosing to also

	other academic unit(s) which is/ are **equivalent** to this course? If so, please give details.	retain this as a course.
xii	**Justification/ Need** for introducing the course	Clearly useful since it was once institute core. Data analysis should be useful to all. It is especially relevant for CSE additionally because of relation to machine learning and because it can be intensely computational.

3.c) Proposal for a new course ‘Logic for Computer Science’:

Name of Academic Unit (Department /School/ Centre/ ID Group) : CSE

Preamble to the proposal (optional) : 2nd year core course. Should have 2xx number.

Level : Undergraduate

Programme : B.Tech.

i	**Title** of the course	Logic for Computer Science
ii	Credit Structure (**L-T-P-C**)	3-0-0-6
iii	**Type** of Course (Institute/ Departmental) + (Core/ Elective/ ...)	UG Core
iv	Semester in which normally to be offered (**Autumn/Spring**)	Spring
v	Whether **Full or Half Semester** Course	Full
vi	**Pre-requisite(s)**, if any (For the students) – *specify course number(s)*	CS 101
vii	Course **Content** *	1 Propositional logic: 1.1 Declarative sentences 1.2 Natural deduction 1.2.1 Rules for natural deduction 1.2.2 Derived rules 1.2.3 Provable equivalence 1.3 Propositional logic as a formal language 1.4 Semantics of propositional logic 1.4.1 The meaning of logical connectives 1.4.2 Soundness of propositional logic 1.4.3 Completeness of propositional logic 1.5 Normal forms 1.5.1 Semantic equivalence, satisfiability, and validity 1.5.2 Conjunctive normal forms and validity 1.5.3 Horn clauses and satisfiability 1.6 SAT solvers 2 Predicate logic 2.1 Predicate logic as a formal language 2.1.1 Terms 2.1.2 Formulas 2.1.3 Free and bound variables 2.1.4 Substitution 2.2 Proof theory of predicate logic

		2.2.1 Natural deduction rules 2.2.2 Quantifier equivalences 2.3 Semantics of predicate logic 2.3.1 Models 2.3.2 Semantic entailment 2.3.3 The semantics of equality 2.4 Undecidability of predicate logic 2.5 Expressiveness of predicate logic 3 Program correctness 3.1 Notion of program correctness 3.1.1 Hoare triples 3.1.2 Partial and total correctness 3.1.3 Program variables and logical variables 3.2 Proof calculus for partial correctness 3.2.1 Proof rules 3.2.2 Proof tableaux 3.3 Proof calculus for total correctness 3.4 Programming by contract 4 Other Applications such as Logic in databases, Logic programming, Puzzle solving 5 Practice with Verification tools
viii	**Texts/References** **	Logic in Computer Science. Huth and Ryan. Cambridge University Press, 2004
ix	Name(s) of **Instructor(s)** ***	Supratik Chakraborty, Bharat Adsul, Om Damani
x	Name(s) of **other Departments/ Academic Units to whom** the course is **relevant**	EE, MA
xi	Is/Are there any course(s) in the same/ other academic unit(s) which is/ are **equivalent** to this course? If so, please give details.	No
xii	**Justification/ Need** for introducing the course	A core course in Logic is currently missing.

3.d) Proposal for a new course ‘Automata Theory’:

Name of Academic Unit (Department /School/ Centre/ ID Group) : CSE

Preamble to the proposal (optional) : 3rd year core course. Should have 3xx number.

Level : Undergraduate

Programme : B.Tech.

i	**Title** of the course	Automata Theory
ii	Credit Structure (**L-T-P-C**)	3-0-0-6
iii	**Type** of Course (Institute/ Departmental) + (Core/ Elective/ ...)	UG Core
iv	Semester in which normally to be offered (**Autumn/Spring**)	Spring
v	Whether **Full or Half Semester** Course	Full
vi	**Pre-requisite(s)**, if any (For the students) – *specify course number(s)*	CS 101
vii	Course **Content** *	Finite state machines (DFA/NFA/epsilon NFAs), regular expressions. Properties of regular languages. My hill-Nerode Theorem. Non-regularity. Push down automata. Properties of context-free languages. Turing machines:Turing hypothesis, Turing computability, Nondeterministic, multi tape and other versions of Turing machines. Church`s thesis, recursively enumerable sets and Turing computability. Universal Turing machines. Unsolvability, The halting problem, partial solvability, Turing enumerability, acceptability and decidability, unsolvable problems about Turing Machines. Post`s correspondence problem.
viii	**Texts/References** **	1.Introduction to Automata Theory, Languages and Computation, by John. E. Hopcroft, Rajeev Motwani, J. D. Ullman, published by Pearson Education Asia, 2006. 2.Elements of the Theory of Computation, by H.R. Lewis and C.H.Papadimitrou, published by Prentice Hall Inc, 1981.
ix	Name(s) of **Instructor(s)** ***	Supratik Chakraborty, Bharat Adsul, Krishna Narayanan
x	Name(s) of **other Departments/**	

	Academic Units to whom the course is **relevant**	
xi	Is/Are there any course(s) in the same/ other academic unit(s) which is/ are **equivalent** to this course? If so, please give details.	CS 208, ‘Automata Theory and Logic’. Content of this course are being slightly changed as per new curriculum.
xii	**Justification/ Need** for introducing the course	A new core course in Logic is being proposed. Hence the Logic portion of the previous CS 208 will be covered in new logic course and old course should just cover ‘Automata Theory’.