Agenda for BOS Meeting, Nov 2017

1. **Intake B Tech CSE**
   The current intake in 2017 batch was 180. In the current semester, the lab capacity has been enhanced by 108 computer terminals. It is therefore proposed to enhance the intake to 240 from 2018 batch onwards.

2. **Intake B Tech IT**
   The current intake in 2017 batch was 30. In the current semester, the lab capacity has been enhanced by 108 computer terminals. It is therefore proposed to enhance the intake to 60 from 2018 batch onwards.

3. **M Tech CSE (Information Security).**
   A new M Tech programme M Tech CSE (Software System Security) was proposed in the last academic council meeting after recommendations of the BOS. The academic council suggested changing the title of the programme to M Tech CSE (Information Security). It is proposed to accept the suggestion of the academic council. M Tech CSE (Information Security) will also be offered from July 2018.

4. **Introduction of new Elective Courses**
   It is proposed to introduce new electives as per details below and recommend attached course descriptions (Annexure-I, II, and III).
   (a) Computer Game Design
   (b) Real World Applications of Algorithms
   (c) Mobile and Distributed Computing

Annexure-I

Course Description of "Computer Game Design"

Course Code: 17B1WCI812

Course Credits: 3 (3-0-0)

Course description and Objective and Outcomes of the Course

Course description:

This course is an introduction to current and future technologies for computer game design and scripting. Topics include graphics, game scripting, game engines, motion control, the narrative in games, game interfaces, artificial intelligence, music and sound, "Serious Games" and social and interface issues of game development.

Students enrolled in Computer Game Design program will have the opportunity to learn techniques for using interactive storytelling to design games. Program coursework exposes students to design processes such as planning, prototype development, and testing. Students also learn about the theoretical and conceptual understanding of the field of game design, along with practical exposure to the process of creating a game. The coursework describes the deepest and most fundamental principles of game design.

Course Objectives:
In this class

- We will discuss games and game design. It includes the history and philosophy of games, the game production process.
- We will discuss introduction to the electronic game design and development careers

- We will discover what the components of games are, and what parts of games are influenced by their design.
- We will learn several ways to approach the design of a game, and processes and best practices for prototyping, playtesting and balancing a game after it has been designed.

Student Learning Outcomes:

By the end of the Game Design course, students will demonstrate proficiency with:

- Identifying the fundamental skills and techniques of game design
- Applying the fundamental skills and techniques of game design in the construction of a game prototype
- Refining a game prototype through a productive cycle of playtesting
- Participating in the iterative process in a mutually respectful, collaborative team environment
- Executing a well-planned presentation that includes an analysis of the final product and game design process
- You will be familiar with the (relatively small) body of work that is accepted in the game industry as the theoretical foundation of game design.
- You will also be comfortable enough in processes to start designing your own games, as well as critically analyzing other people's games.

Course Syllabus:

	Topics	HRS
1	**The Role of the Game:** An Advocate for the Player, An Advocate for the Player, Passions, and Skills, A Play centric Design Process, Designers You Should Know, The Iterative Design Process, Designing for Innovation, Conclusion, Designer Perspective: Peter Molyneux, Designer Perspective: Warren Spector, Further Reading.	3
2	**The Structure of Games:** Go Fish versus Quake, Engaging the Player, What is a Puzzle?, The Sum of the Parts, Defining Games, Beyond Definitions, Conclusion, Designer Perspective: American McGee, Designer Perspective: Sandy Petersen, Further Reading.	3
3	**Working with Formal Elements:** Players, Persuasive Games, Objectives, Procedures, Resources, Conflict, Boundaries, Outcome, Conclusion, Designer Perspective: Lorne Lanning, Designer Perspective: Marc LeBlanc, Further Reading.	3
4	**Working with Dramatic Elements:** Challenge, Play, Premise, Character, Story, The Two Great Myths of Interactive Storytelling, World Building, The Dramatic Arc, Conclusion, Designer Perspective: Dr. Ray Muzyka, Designer Perspective: Don Daglow, Further Reading.	3
5	**Working with System Dynamics:** Games as Systems , System Dynamics , Deconstructing Set, Interacting with Systems, A Conversation with Will Wright, Tuning Game Systems, Table of Contents ix Conclusion, Designer Perspective: Alan R. Moon, Designer Perspective: Frank Lantz, Further Reading.	3
6	**Conceptualization:** Coming Up With Ideas, Brainstorming Skills, Alternate Methods, Editing and Refining, Electronic Arts Preproduction Workshop, Turning Ideas into a Game, Where Do Game Ideas Come From?, Conclusion, Designer Perspective: Bill Roper, Designer Perspective: Josh Holmes, Further reading.	3
7	**Prototyping:** Methods of Prototyping, Catastrophic Prototyping, and Other Stories, Prototyping Your Original Game Idea, The Design Evolution of Magic: The Gathering, Making the Physical Prototype Beer, Beyond the Physical Prototype, Conclusion, Designer Perspective: James Ernest, Designer Perspective: Katie Salen, Further Reading.	3

8	**Digital Prototyping:** Types of Digital Prototypes, Using So ware Prototypes in Game, Prototyping for Game Feel, Designing Control Schemes, Prototyping Cloud, Selecting Viewpoints, x Table of Contents Effective Interface Design, Prototyping Tools, Conclusion, Designer Perspective: David Perry, Designer Perspective: Brenda Braithwaite, Further Reading.	3
9	**Play testing:** Play testing and Iterative Design, Recruiting Play testers, Conducting a Play testing Session, Methods of Play testing, 256 Why We Play Games, The Play Matrix, Taking Notes, Basic Usability Techniques, Data Gathering, Test Control Situations, How Feedback from Typical Gamers Can Help Avoid Disappointing Outcomes, Play testing Practice ,Conclusion , Designer Perspective: Rob Daviau, Designer Perspective: Graeme Bayless, Further reading.	3
10	**Functionality, Completeness, and Balance:** What Are You Testing For?, Is Your Game Functional?, Is Your Game Internally Complete?, Is Your Game Balanced? , A Conversation with Rob Pardo, Techniques for Balancing Your Game, Conclusion, Designer Perspective: Brian Hersch, Designer Perspective: Heather Kelley, Further Reading.	3
11	**Fun and Accessibility:** Is Your Game Fun?, Improving Player Choices, The Core Mechanic: Game Design as Activity Design, Fun Killers, Beyond Fun, Is Your Game Accessible?, Using Audio as a Game Feedback Device, Conclusion, Designer Perspective: Richard Hilleman, Designer Perspective: Bruce C. Shelley, Further Reading.	3
12	**Team Structures:** Team Structure, Developer's Team, Applying for a Job in Game Design, Advice from the International Game Developers Association (IGDA) on Choosing an Academic Game Program, Publisher's Team, Team Profile, All Contribute to the Design, Team Building, Team Communication, Conclusion, Further Reading.	3
13	**Stages of Development:** Stages Defined, From Classroom to Console: Producing flow for the PlayStation, How to Make a Project Plan, Business Opportunities for Independents, Conclusion, Designer Perspective: Stan Chow, Designer Perspective: Starr Long, Further Reading.	3
14	**The Design Document:** Communication and the Design Document, Contents of a Design Document, Table of Contents Writing Your Design Document, Indie Game Jam: An Outlet for Innovation and Experimental Game Design, Conclusion, Further Reading.	3
		Total Hours: 42

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Data Structures) (10B11CI211)	Level of Attainment	PO- 1	PO- 2	PO- 3	PO- 4	PO- 5	PO- 6	PO- 7	PO- 8	PO- 9	Weigh t age
1. To gain knowledge of the role of the Game	Familiarity	H	M	H	L	M	H	H	M	L	74%
2. To have exposure to structure of game	Familiarity	H	H	H	L	M	H	H	H	M	85%
3. To have hands-on skills to work with formal elements of game design	Computatio nal skills	H	H	H	L	M	H	M	H	M	84%
4. To have hands-on skills to Working with Dramatic Elements.	Assessment	H	H	H	H	M	H	H	M	M	88%
5. To have hands-on skills to Working with System	Assessment	H	H	H	M	M	H	H	H	M	92%

Dynamics											
6. To acquire knowledge of conceptualization	Technical skills	H	H	H	M	M	M	H	M	M	80%
7. To learn game prototyping	Technical skills	H	H	H	M	M	M	M	M	M	78%
8. To gain an understanding of play testing, functionality, completeness, and balance in game design.	Technical skills	H	H	H	H	M	H	H	M	M	92%
9. To have exposure to build teams for computer game designing	Assessment	H	H	H	H	M	H	H	H	M	85%
Weightage		100%	96%	96%	96%	63%	93%	93%	81%	63%	

Methodology:

Teaching in this course is designed to engage the students in active learning by taking a problem solving and design-oriented approach with special emphasis on real-world applications. Students are expected to know the basics of computer game design to carry out a lot of design for solving a problem.

Evaluation scheme:

Mid Sem-1	– 15 marks	
Mid Sem-2	– 25 marks	
Mid Sem-3	– 35 marks	
Internal Assessment(Assignments/Quizzes/attendance)		– 25 marks
Total	**100 marks**	

Suggested Readings

The following background readings provide more detailed coverage of the course material:

Text Book(s)

- Game Design Workshop, 3rd Edition: A Playcentric Approach to Creating Innovative Games is a book on game design by Tracy Fullerton, originally published by CMP Books.

Reference Book(s)

- **A Theory of Fun for Game Design, by Koster.** This book shows the similarities between game design and education, with a good discussion of the concept of Flow. Half text and half cartoons, this short book flows nicely and can be read in the afternoon or two.
- **Understanding Comics: The Invisible Art, by McCloud**. While this book claims to be about comics, many of the lessons within can be applied to game design and other forms of art. It also happens to be a comic book itself, and fun to read.

Annexure-II

Course Description of "Real World Applications of Algorithms"

Course Credits: 3 (3-0-0)

Course description and Objective and Outcomes of the Course

This course covers how algorithms and theory are used in "real-world" applications. The course will cover both the theory behind the algorithms and case studies of how the theory is applied.

The objective of the course:

Interesting algorithms arise in many real world applications in a broad variety of areas. Getting a better understanding of where and how these algorithms are used can be valuable in many ways. It can help in the teaching of algorithms by supplying up-to-date examples of the contexts in which algorithms are used. It can help make effective use of algorithms in the industry by allowing better sharing of experiences. It can help motivate new problems to consider or can improve our understanding of the models and the assumptions we make in various problem domains. It can give us a better feeling of what it takes to have industry use algorithms, and it can help us better understand what factors are important in the design of algorithms.

Outcomes:

Students will learn:

- What is the process of getting algorithms used in the real world?
- How important are constants and how important are asymptotics in practice?
- Are there application domains in which algorithms should be playing a larger part?
- How do we deal with the tension between (a) creating broadly useful algorithms for generic problems, and (b) meeting the needs of a specific client?
- The real world is noisy. How should algorithms deal with noisy input data?

Following topics will be covered:

	Topics	HRS
1	**Compression:** Information Theory. Huffman/Arithmetic/Gamma Codes. Context Coding/PPM. Lempel Ziv/Gzip/Burrows Wheeler. Graph Compression.	5
2	**Linear and Integer programming:** Flow problems as Linear programs. Simplex, Ellipsoid, and Interior point methods. Reductions to integer programs. Basic techniques for solving integer programs. Airline crew scheduling.	5
3	**Cryptography:** One-way functions, basic protocols. Number theory review: groups, fields, Galois fields. Private key cryptosystems (Block Ciphers, Rijdael. Public key cryptosystems (SSL, RSA, ElGamal, Diffie-Hellman), Kerberos and Digital Cash.	5
4	**Error Correcting Codes:** Hamming Codes, Linear Codes. Reed Solomon Codes, Cyclic Codes. Expander graphs and Tornado codes.	5
5	**Dimensionality Reduction:** Random Projections and Johnson-Lindenstrauss. Singular-Value Decompositions. Compressive Sensing.	5

6	**Computational Biology:** Approximate String Matching. Various gap and cost models. BLAST/FAST - Sequencing the Human Genome.	5
7	**Satisfiability:** Proof Systems, Resolution. DPLL type algorithms, with advanced features (clause learning, backtracking heuristics, ...). Local-search based methods. Reduction strategies to encode your problems as SAT instances.	5
8	**Computational Geometry:** Polygon Triangulation: Implementation & Apps. Voronoi Diagram. Delaunay Triangulations: Applications. Robot Motion Planning.	5
9	**Miscellaneous applications:**	2
		Total Hours: 42

Annexure-III

Course Description of "Mobile and Distributed Computing"

Course Credits: 3 (3-0-0)

Course Objective

- The objective of this course is to introduce fundamentals and basic techniques of distributed and mobile computing and provide them with the basic skills of how to write distributed programs.
- To make the student understand the concept various system model of distributed computing, communication.
- To make the student understand the concept networking and internetworking of the distributed computing.
- To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
- To understand the typical mobile networking infrastructure through a popular GSM protocol
- To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
- To understand the database issues in mobile environments & data delivery models.

Outcomes:

- Students will be able to understand the basic concept and skills of distributed computing.
- Students are expected to learn various system model and internetworking concepts of distributed computing.
- Students will be able to understand & develop any existing or new protocol related to mobile environment.
- Students will be able to understand and learn the MAC issues of mobile computing environment and its solution.
- Students are expected to develop distributed applications using latest technologies.

Topics	HRS
1. **DISTRIBUTED COMPUTING (INTRODUCTION&CHARACTERIZATION)** Introduction to Distributed Computing, Evolution, Characteristics, Design Issues, User Requirements, Distributed Computing Models-Workstation Model, Workstation-	5

	Server Model, Processor–Pool Model.	
2.	**SYSTEM MODELS& COMMUNICATION** Client Server Communication, Group Communication, IPC - Message Passing – Features, RPC – Model, Implementation, Stub Generation, RPC Messages, Communication Protocols Marshaling, Distributed Shared Memory – Architecture, Design Issues, Thrashing, Replacement Strategy, Synchronization – Clock Synchronization, Event Ordering, Mutual Exclusion.	6
3.	**NETWORKING & INTERNETWORKING** Types of networks, Network principles, Internet protocols, Case studies: Ethernet, WiFi, Bluetooth and ATM.	5
4.	**MOBILE COMPUTING-INTRODUCTION** Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices, GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security.	6
5.	**WIRELESS MEDIUM ACCESS CONTROL (MAC)** Motivation for a specialized MAC (Hidden and Exposed terminals, Near and Far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN (IEEE 802.11).	5
6.	**MOBILE NETWORK LAYER:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.	5
7.	**MOBILE TRANSPORT LAYER** Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.	5
8.	**DATABASE ISSUES:** Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.	5
	Total Hours: 42	

Course Textbook

Jean Dollimore, Tim Kindberg, George Coulouris, Distributed Systems: Concepts and Design, 4th Edition, Addison Wesley.
George Coulouris , Jean Dellimore and Tim Kindberg, Distributed Systems- Concepts and designing, PHI.
Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition.

5. Structure of B Tech CSE Programme

The current curricula consist of 195 credits as below. Elective courses are offered only in VII and VIII Semester. It is proposed to recommend changes to the course structure to allow electives to be offered earlier and facilitate CBCS compliance.

I Sem-	23 credits	II Sem-	23 credits
III Sem-	23 credits	IV Sem-	26 credits
V Sem-	28 credits	VI Sem-	28 credits
VII Sem-	22 credits	VIII Sem-	22 credits
Total-	195 credits		

Parameters for the proposed scheme:

(a) Follow the guidelines of model CSE curricula of AICTE for credit distribution as under:

S. No.	Course Work - Subject Area	Range of Total Credits (%)	Suggested Breakdown of

				Credits (for Total=176)
		Minimum	Maximum	
1	Humanities and Social Sciences (HS), including Management;	5	10	14
2	Basic Sciences (BS) including Mathematics, Physics, Chemistry, Biology;	15	20	30
3	Engineering Sciences (ES), including Materials, Workshop, Drawing, Basics of Electrical/Electronics/Mechanical/Computer Engineering, Instrumentation;	15	20	30
4	Professional Subjects-Core (PC), relevant to the chosen specialization/branch; (May be split into Hard (no choice) and Soft (with choice), if required;)	30	40	50
5	Professional Subjects – Electives (PE), relevant to the chosen specialization/ branch;	10	15	20
6	Open Subjects- Electives (OE), from other technical and/or emerging subject areas;	5	10	12
7	Project Work (PR), Seminar and/or Internship in Industry or elsewhere.	10	15	20
8	Mandatory Courses (MC); Non-Credit 8 units			
		90	130	176

(b) Student Engagement: As per ACM IEEE CS2013 curricula, total CSE core hours are 308 Hrs and available Hrs are around 280. So the courses are classified as Tier-1 (165 Hrs, mandatory) and Tier II (143 Hrs, Minimum 80% to be covered). To keep alignment with the knowledge areas in this study we propose a structure with student engagement of about 280 hours.

Proposed scheme: Based on above parameters, a course structure aligned with ACM-IEEE CS2013 and Model Course structure of AICTE as under is proposed.

B Tech CSE Curricula -2018 onwards											
Sem-1											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
HS	HS-1		Engineering Economics	3	0	0	3	3	0	0	3
BS	BS-1		Elementary Math for Engineers	3	0	0	3	3	0	0	3
BS	BS-2		Applied Physics-I	3	0	0	3	3	0	0	3
BS	BS-2P		Applied Physics Lab-I	0	0	1	1	0	0	2	2
ES	ES-1		Engg Graphics	2	0	0	2	2	0	0	2
ES	ES-1P		Engg Graphics Lab	0	0	2	2	0	0	4	4
ES	ES-2		Introduction to Computers and Programming	3	1	0	4	3	2	0	5
ES	ES-2P		Computer Programming Lab	0	0	2	2	0	0	4	4
ES	ES-3		Electrical Circuit Analysis	3	0	0	3	3	0	0	3
ES	ES-3P		Electrical Circuit Analysis Lab	0	0	1	1	0	0	2	2
MC	MC-1		Technical English (Non Credit)					3	0	0	3
			Total	17	1	5	24	17	2	12	34

Sem-2											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
HS	HS-2		Communication and Presentation Skills	2	0	0	2	2	0	0	2
HS	HS-2P		Communication and Presentation Skills Lab-I	0	0	1	1	0	0	2	2
BS	BS-3		Differential Equations	3	0	0	3	3	0	0	3
BS	BS-4		Applied Physics-II	3	0	0	3	3	0	0	3
BS	BS-4P		Applied Physics Lab-II	0	0	1	1	0	0	2	2
BS	BS-5		Discrete and Fuzzy Mathematics	3	0	0	3	3	0	0	3
ES	ES-4		Data Structures and Computer Programming Lab	3	1	0	4	3	2	0	5
ES	ES-4P		Data Structures and Computer Programming Lab	0	0	2	2	0	0	4	4
ES	ES-5		Basic Electronic Devices and Circuits	3	0	0	3	3	0	0	3
ES	ES-5P		Basic Electronics Lab	0	0	1	1	0	0	2	2
ES	ES-6		Environmental Studies	2	0	0	2	2	0	0	2
MC	MC-2		Value Education, Human Rights and Legislative Procedures(Non Credit)					3	0	0	3
			Total	19	1	5	25	22	2	10	34

Sem-3											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
HS	HS-3		Fin Management	3	0	0	3	3	0	0	3
BS	BS-6		Complexity Analysis	3	0	0	3	3	0	0	3
BS	BS-7		Material Science	3	0	0	3	3	0	0	3
BS	BS-8		Engineering Biology	3	0	0	3	3	0	0	3
ES	ES-7P		Basic Simulation Lab-I	0	0	2	2	0	0	4	4
ES	ES-8		Digital Electronics	3	0	0	3	3	0	0	3
ES	ES-8P		Digital Electronics Lab	0	0	1	1	0	0	2	2
ES	ES-9P		Unix Programming Lab	0	0	1	1	0	0	2	2
PC	PC-1		Object Oriented Programming	3	1	0	4	3	2	0	5
PC	PC-1P		Object Oriented Programming Lab	0	0	1	1	0	0	2	2
PC	PC-16P		Multimedia Development Lab	0	0	1	1	0	0	2	2
MC	MC-3		Foreign Language-French(Non Credit)	0	0	0	0	3	0	0	3
			Total	18	1	6	25	21	2	12	35

Sem-4											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
HS	HS-4		Law for Engineers	3	0	0	3	3	0	0	3
BS	BS-9		Probability and Statistics	3	0	0	3	3	0	0	3
PC	PC-2		Design and Analysis of algorithms	3	1	0	4	3	2	0	5
PC	PC-2P		Design and Analysis of algorithms Lab	0	0	1	1	0	0	2	2
PC	PC-3		Database Systems	3	1	0	4	3	2	0	5
PC	PC-		Database Systems Lab	0	0	1	1	0	0	2	2

	3P										
PC	PC-4		Microprocessors and Controllers	3	1	0	4	3	2	0	5
PC	PC-4P		Microprocessors and Controllers Lab	0	0	1	1	0	0	2	2
OE	OE-1		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
MC	MC-4		Optimisation Techniques(Non Credit)				0	3	0	0	3
				18	3	3	24	21	6	6	33

Sem-5											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
HS	HS-5		Industrial Psychology	3	0	0	3	3	0	0	3
PC	PC-5		Operating Systems	3	1	0	4	3	2	0	5
PC	PC-5P		Operating Systems Lab	0	0	1	1	0	0	2	2
PC	PC-6		Theory of Computation	3	1	0	4	3	2	0	5
PC	PC-7		Software Testing and Debugging	3	1	0	4	3	2	0	5
PC	PC-7P		Software Testing and Debugging Lab	0	0	2	2	0	0	4	4
PE	PE-1		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
OE	OE-2		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
MC	MC-5		Managing Innovation and Entrepreneurship(Non Credit)				0	3	0	0	3
				18	3	3	24	21	6	6	33

Sem-6											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
PC	PC-8		Computer Networks	3	1	0	4	3	2	0	5
PC	PC-8P		System and Network Programming Lab	0	0	2	2	0	0	4	4
PC	PC-9		Compiler Design	3	1	0	4	3	2	0	5
PC	PC-9P		Compiler Design Lab	0	0	1	1	0	0	2	2
PC	PC-10		Computer Organisation and Architecture	3	0	0	3	3	0	0	3
PC	PC-11P		Web Technology Lab	0	0	1	1	0	0	2	2
PC	PC-12		Distributed Computing	3	0	0	3	3	0	0	3
PE	PE-2		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
PR	PR-1		Project Part-1 (Minor Project)	0	0	3	3	0	0	6	6
MC	MC-6		System Analysis and Design(Non Credit)				0	3	0	0	3
				15	2	7	24	18	4	14	36

Sem-7											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
PR	PR-II		Project Part-II	0	0	7	7	0	0	14	14
PC	PC-13		Simulation and Modelling Techniques	3	0	0	3	3	0	0	3
PC	PC-		Simulation Lab-II	0	0	1	1	0	0	2	2

	13P										
PC	PC-14		Computer Graphics	3	0	0	3	3	0	0	3
PC	PC-14P		Computer Graphics Lab	0	0	1	1	0	0	2	2
PE	PE-3		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
PE	PE-4		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
OE	OE-3		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
MC	MC-7		Artificial Intelligence and Robotics(Non Credit)				0	3	0	0	3
				15	0	9	24	15	0	18	36

Sem-8											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
PR	PR-III		Project Part-III	0	0	10	10	0	0	20	20
PC	PC-15		Advanced Computational Techniques in Engineering	3	0	0	3	3	0	0	3
PE	PE-5		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
PE	PE-6		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
PE	PE-7		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
OE	OE-4		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
MC	MC-8		Knowledge Management(Non Credit)				0	3	0	0	3
				15	0	10	25	18	0	20	38

List of Programme Electives				
GP	Srl	Code	Subject	S
PE	PE-1		Advanced Algorithms	E
PE	PE-2		Advanced Operating Systems	E
PE	PE-3		Advanced Software Engg	E
PE	PE-4		Algebraic Number Theory	E
PE	PE-5		Big Data Analytics	E
PE	PE-6		Bio-informatics	E
PE	PE-7		Biophysics of Single molecules	E
PE	PE-8		Cloud Computing	E
PE	PE-9		Computer Games	E
PE	PE-10		Cryptography and Network Security	E
PE	PE-11		Design and Analysis of Algorithms	E
PE	PE-12		Embedded Systems	E
PE	PE-13		Human Aspects for Information Technology	E
PE	PE-14		Human Computer Interface	E
PE	PE-15		Image Processing	E
PE	PE-16		Information Retrieval and Data mining	E
PE	PE-17		Integral Transforms	E
PE	PE-18		Mobile and Distributed Computing	E
PE	PE-19		Mobile Communications	E
PE	PE-20		Multimedia Computing	E

PE	PE-21		Nanoscale devices	E
PE	PE-22		Network Management	E
PE	PE-23		Operation Research	E
PE	PE-24		Optical Fibre Networks	E
PE	PE-25		Parallel Processing	E
PE	PE-26		Parallel Programming Techniques	E
PE	PE-27		Partial Differential Equations	E
PE	PE-28		Photonic and Microwave Devices	E
PE	PE-29		Probability Theory and Random Processes	E
PE	PE-30		Quantum Computing	E
PE	PE-31		Script Programming	E
PE	PE-32		Service Oriented Architecture	E
PE	PE-33		Soft Computing	E
PE	PE-34		Special Theory of Relativity	E
PE	PE-35		Storage Networks	E
PE	PE-36		Systems Programming	E
PE	PE-37		Web Service and Service Oriented Architecture	E
PE	PE-38		Abstract Algebra	O
PE	PE-39		Advanced JAVA	O
PE	PE-40		Advanced Computer Networks	O
PE	PE-41		Advanced Data Structures	O
PE	PE-42		Advanced Database Systems	O
PE	PE-43		ARM based Embedded System Design	O
PE	PE-44		Artificial Intelligence	O
PE	PE-45		Astrophysics	O
PE	PE-46		Biometric Recognition Techniques	O
PE	PE-47		Biosciences	O
PE	PE-48		C# and VB.NET	O
PE	PE-49		Combinational Optimization	O
PE	PE-50		Computer Graphics	O
PE	PE-51		Computer Vision	O
PE	PE-52		Design of Database Sytems	O
PE	PE-53		Digital Signal Processing	O
PE	PE-54		Game Theory	O
PE	PE-55		General Theory of Relativity	O
PE	PE-56		Graph Algorithms and Applications	O
PE	PE-57		Graph Theory	O
PE	PE-58		High Performance Computer Architecture	O
PE	PE-59		Image Processing Techniques	O
PE	PE-60		Information Retrieval & Data Mining	O
PE	PE-61		Information Theory and Applications	O
PE	PE-62		Learning Sciences and Technology	O
PE	PE-63		Mobile Computing	O
PE	PE-64		Multi-Dimensional Data Structures	O
PE	PE-65		Nano Science and Technology	O

PE	PE-66		Network Programming	O
PE	PE-67		Numerical Analysis	O
PE	PE-68		Optical Fibre Networks	O
PE	PE-69		Optimisation Techniques	O
PE	PE-70		Principles of Programming Languages	O
PE	PE-71		Research Methodology	O
PE	PE-72		Soft Computing	O
PE	PE-73		Software Agents	O
PE	PE-74		Software Architecture	O
PE	PE-75		Software Engineering Management	O
PE	PE-76		Software Project Management	O
PE	PE-77		VLSI Design & Algorithms	O

List of Open Electives			
OE	OE-1		Artificial Intelligence and Robotics
OE	OE-2		Cloud Computing
OE	OE-3		Database Management Systems
OE	OE-4		Design and Analysis of Algorithms
OE	OE-5		Digital Communication
OE	OE-6		Digital Signal Processing
OE	OE-7		Disaster Management
OE	OE-8		Distributed Computing
OE	OE-9		Engineering Risk–Benefit Analysis
OE	OE-10		Engineering System Analysis and Design
OE	OE-11		Engineering System Design Optimization
OE	OE-12		Engineering System Modeling and Simulation
OE	OE-13		Game Theory with Engineering Applications
OE	OE-14		Global Strategy and Technology
OE	OE-15		Infrastructure Systems Planning
OE	OE-16		Internet of Things Architecture and Design(OE)
OE	OE-17		Knowledge Management
OE	OE-18		Managing Innovation and Entrepreneurship
OE	OE-19		Network Management(OE)
OE	OE-20		Network Security and Cryptography Techniques(OE)
OE	OE-21		Planning for Sustainable Development
OE	OE-22		Project Management
OE	OE-23		Rural Technology & Community Development
OE	OE-24		Software Engineering
OE	OE-25		Supply Chain Management-Planning
OE	OE-26		Wireless Sensor Networks-Protocols and Applications(OE)

Summary of Credit Distribution									
Sem	HS	BS	ES	PC	PE	OE	PR	MC	CR
1	3	7	14	0	0	0	0	0	24
2	3	10	12	0	0	0	0	0	25
3	3	9	7	6	0	0	0	0	25
4	3	3	0	15	0	3	0	0	24
5	3	0	0	15	3	3	0	0	24
6	0	0	0	18	3	0	3	0	24
7	0	0	0	8	6	3	7	0	24
8	0	0	0	3	9	3	10	0	25
CR	15	29	33	65	21	12	20	0	195
%	7.7	14.9	16.9	33.3	10.8	6.2	10.3	0.0	100.0

Summary of Student Engagement in Hours									
Sem	HS	BS	ES	PC	PE	OE	PR	MC	Hrs
1	3	8	20	0	0	0	0	3	34
2	4	11	16	0	0	0	0	3	34
3	3	9	11	9	0	0	0	3	35
4	3	3	0	21	0	3	0	3	33
5	3	0	0	21	3	3	0	3	33
6	0	0	0	24	3	0	6	3	36
7	0	0	0	10	6	3	14	3	36
8	0	0	0	3	9	3	20	3	38
HRS	16	31	47	88	21	12	40	24	279
%	5.7	11.1	16.8	31.5	7.5	4.3	14.3	8.6	100

6. Structure of B Tech IT Programme

On similar parameters, the proposed structure of B Tech IT is given below.

B Tech IT Curricula - 2018 onwards												
Sem-1												
Course				Cr				Hrs				
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total	
HS	HS-1		Engineering Economics	3	0	0	3	3	0	0	3	
BS	BS-1		Elementary Math for Engineers	3	0	0	3	3	0	0	3	
BS	BS-2		Applied Physics-I	3	0	0	3	3	0	0	3	
BS	BS-2P		Applied Physics Lab-I	0	0	1	1	0	0	2	2	
ES	ES-1		Engg Graphics	2	0	0	2	2	0	0	2	
ES	ES-1P		Engg Graphics Lab	0	0	2	2	0	0	4	4	
ES	ES-2		Introduction to Computers and Programming	3	1	0	4	3	2	0	5	
ES	ES-2P		Computer Programming Lab	0	0	2	2	0	0	4	4	
ES	ES-3		Electrical Circuit Analysis	3	0	0	3	3	0	0	3	
ES	ES-3P		Electrical Circuit Analysis Lab	0	0	1	1	0	0	2	2	
MC	MC-1		Technical English (Non Credit)					3	0	0	3	
			Total	17	1	6	24	20	2	12	34	

Sem-2											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
HS	HS-2		Communication and Presentation Skills	2	0	0	2	2	0	0	2
HS	HS-2P		Communication and Presentation Skills Lab-I	0	0	1	1	0	0	2	2
BS	BS-3		Differential Equations	3	0	0	3	3	0	0	3
BS	BS-4		Applied Physics-II	3	0	0	3	3	0	0	3
BS	BS-4P		Applied Physics Lab-II	0	0	1	1	0	0	2	2
BS	BS-5		Discrete and Fuzzy Mathematics	3	0	0	3	3	0	0	3
ES	ES-4		Data Structures and Computer Programming Lab	3	1	0	4	3	2	0	5
ES	ES-4P		Data Structures and Computer Programming Lab	0	0	2	2	0	0	4	4
ES	ES-5		Basic Electronic Devices and Circuits	3	0	0	3	3	0	0	3
ES	ES-5P		Basic Electronics Lab	0	0	1	1	0	0	2	2
ES	ES-6		Environmental Studies	2	0	0	2	2	0	0	2
MC	MC-2		Value Education, Human Rights and Legislative Procedures(Non Credit)					3	0	0	3
			Total	19	1	5	25	22	2	10	34

Sem-3											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
HS	HSS-3		Fin Management	3	0	0	3	3	0	0	3
BS	BS-6		Complexity Analysis	3	0	0	3	3	0	0	3
BS	BS-7		Material Science	3	0	0	3	3	0	0	3
BS	BS-8		Engineering Biology	3	0	0	3	3	0	0	3
ES	ES-7P		Basic Simulation Lab-I	0	0	2	2	0	0	4	4
ES	ES-8		Digital Electronics	3	0	0	3	3	0	0	3
ES	ES-8P		Digital Electronics Lab	0	0	1	1	0	0	2	2
ES	ES-9P		Unix Programming Lab	0	0	1	1	0	0	2	2
PC	PC-1		Object Oriented Programming	3	1	0	4	3	2	0	5
PC	PC-1P		Object Oriented Programming Lab	0	0	1	1	0	0	2	2
PC	PC-16P		Multimedia Development Lab	0	0	1	1	0	0	2	2
MC	MC-3		Foreign Language-French(Non Credit)	0	0	0	0	3	0	0	3
			Total	18	1	6	25	21	2	12	35

Sem-4											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
HS	HSS-4		Law for Engineers	3	0	0	3	3	0	0	3
BS	BS-9		Probability and Statistics	3	0	0	3	3	0	0	3
PC	PC-2		Design and Analysis of algorithms	3	1	0	4	3	2	0	5
PC	PC-2P		Design and Analysis of algorithms Lab	0	0	1	1	0	0	2	2
PC	PC-3		Database Systems	3	1	0	4	3	2	0	5
PC	PC-3P		Database Systems Lab	0	0	1	1	0	0	2	2

PC	PC-4		Computer Organisation	3	1	0	4	3	2	0	5
PC	PC-4P		Computer Organisation Lab	0	0	1	1	0	0	2	2
OE	OE-1		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
MC	MC-4		Optimisation Techniques(Non Credit)				0	3	0	0	3
				18	3	3	24	21	6	6	33

Sem-5											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
HS	HSS-5		Industrial Psychology	3	0	0	3	3	0	0	3
PC	PC-5		Operating Systems	3	1	0	4	3	2	0	5
PC	PC-5P		Operating Systems Lab	0	0	1	1	0	0	2	2
PC	PC-6		Cloud Computing	3	1	0	4	3	2	0	5
PC	PC-7		Design of Information Systems	3	1	0	4	3	2	0	5
PC	PC-7P		Design of Information Systems Lab	0	0	2	2	0	0	4	4
PE	PE-1		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
OE	OE-2		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
MC	MC-5		Managing Innovation and Entrepreneurship(Non Credit)				0	3	0	0	3
				18	3	3	24	21	6	6	33

Sem-6											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
PC	PC-8		Computer Networks	3	1	0	4	3	2	0	5
PC	PC-8P		System and Network Programming Lab	0	0	2	2	0	0	4	4
PC	PC-9		Data Mining	3	1	0	4	3	2	0	5
PC	PC-9P		Data Mining Lab	0	0	1	1	0	0	2	2
PC	PC-10		Web Application Engineering	3	0	0	3	3	0	0	3
PC	PC-11P		Web Technology Lab	0	0	1	1	0	0	2	2
PC	PC-12		Information Security	3	0	0	3	3	0	0	3
PE	PE-2		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
PR	PR-1		Project Part-I (Minor Project)	0	0	3	3	0	0	6	6
MC	MC-6		System Analysis and Design(Non Credit)				0	3	0	0	3
				15	2	7	24	18	4	14	36

Sem-7											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
PR	PR-2		Project Part-II	0	0	7	7	0	0	14	14
PC	PC-13		Simulation and Modelling Techniques	3	0	0	3	3	0	0	3
PC	PC-13P		Simulation Lab-II	0	0	1	1	0	0	2	2
PC	PC-14		E Commerce Technologies	3	0	0	3	3	0	0	3
PC	PC-14P		E Commerce Technologies Lab	0	0	1	1	0	0	2	2
PE	PE-3		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
PE	PE-4		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3

OE	OE-3		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
MC	MC-7		Artificial Intelligence and Robotics(Non Credit)				0	3	0	0	3
				15	0	9	24	18	0	18	36

Sem-8											
Course				Cr				Hrs			
GP	Srl	Code	Subject	L	T	P	Total	L	T	P	Total
PR	PR-3		Project Part-III	0	0	10	10	0	0	20	20
PC	PC-15		Entreprise Resource Planning	3	0	0	3	3	0	0	3
PE	PE-5		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
PE	PE-6		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
PE	PE-7		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
OE	OE-4		To Be Selected from Offered Courses	3	0	0	3	3	0	0	3
MC	MC-8		Knowledge Management(Non Credit)				0	3	0	0	3
				15	0	10	25	18	0	20	38

List of Programme Electives				
GP	Srl	Code	Subject	S
PE	PE-1		Advanced Algorithms	E
PE	PE-2		Advanced Operating Systems	E
PE	PE-3		Advanced Software Engg	E
PE	PE-4		Algebraic Number Theory	E
PE	PE-5		Big Data Analytics	E
PE	PE-6		Bio-informatics	E
PE	PE-7		Biophysics of Single molecules	E
PE	PE-8		Cloud Computing	E
PE	PE-9		Computer Games	E
PE	PE-10		Cryptography and Network Security	E
PE	PE-11		Design and Analysis of Algorithms	E
PE	PE-12		Embedded Systems	E
PE	PE-13		Human Aspects for Information Technology	E
PE	PE-14		Human Computer Interface	E
PE	PE-15		Image Processing	E
PE	PE-16		Information Retrieval and Data mining	E
PE	PE-17		Integral Transforms	E
PE	PE-18		Mobile and Distributed Computing	E
PE	PE-19		Mobile Communications	E
PE	PE-20		Multimedia Computing	E
PE	PE-21		Nanoscale devices	E
PE	PE-22		Network Management	E
PE	PE-23		Operation Research	E
PE	PE-24		Optical Fibre Networks	E
PE	PE-25		Parallel Processing	E
PE	PE-26		Parallel Programming Techniques	E
PE	PE-27		Partial Differential Equations	E
PE	PE-28		Photonic and Microwave Devices	E

PE	PE-29		Probability Theory and Random Processes	E
PE	PE-30		Quantum Computing	E
PE	PE-31		Script Programming	E
PE	PE-32		Service Oriented Architecture	E
PE	PE-33		Soft Computing	E
PE	PE-34		Special Theory of Relativity	E
PE	PE-35		Storage Networks	E
PE	PE-36		Systems Programming	E
PE	PE-37		Web Service and Service Oriented Architecture	E
PE	PE-38		Abstract Algebra	O
PE	PE-39		Advanced JAVA	O
PE	PE-40		Advanced Computer Networks	O
PE	PE-41		Advanced Data Structures	O
PE	PE-42		Advanced Database Systems	O
PE	PE-43		ARM based Embedded System Design	O
PE	PE-44		Artificial Intelligence	O
PE	PE-45		Astrophysics	O
PE	PE-46		Biometric Recognition Techniques	O
PE	PE-47		Biosciences	O
PE	PE-48		C# and VB.NET	O
PE	PE-49		Combinational Optimization	O
PE	PE-50		Computer Graphics	O
PE	PE-51		Computer Vision	O
PE	PE-52		Design of Database Sytems	O
PE	PE-53		Digital Signal Processing	O
PE	PE-54		Game Theory	O
PE	PE-55		General Theory of Relativity	O
PE	PE-56		Graph Algorithms and Applications	O
PE	PE-57		Graph Theory	O
PE	PE-58		High Performance Computer Architecture	O
PE	PE-59		Image Processing Techniques	O
PE	PE-60		Information Retrieval & Data Mining	O
PE	PE-61		Information Theory and Applications	O
PE	PE-62		Learning Sciences and Technology	O
PE	PE-63		Mobile Computing	O
PE	PE-64		Multi-Dimensional Data Structures	O
PE	PE-65		Nano Science and Technology	O
PE	PE-66		Network Programming	O
PE	PE-67		Numerical Analysis	O
PE	PE-68		Optical Fibre Networks	O
PE	PE-69		Optimisation Techniques	O
PE	PE-70		Principles of Programming Languages	O
PE	PE-71		Research Methodology	O
PE	PE-72		Soft Computing	O
PE	PE-73		Software Agents	O
PE	PE-74		Software Architecture	O

PE	PE-75		Software Engineering Management	O
PE	PE-76		Software Project Management	O
PE	PE-77		VLSI Design & Algorithms	O

List of Open Electives			
OE	OE-1		Artificial Intelligence and Robotics
OE	OE-2		Cloud Computing
OE	OE-3		Database Management Systems
OE	OE-4		Design and Analysis of Algorithms
OE	OE-5		Digital Communication
OE	OE-6		Digital Signal Processing
OE	OE-7		Disaster Management
OE	OE-8		Distributed Computing
OE	OE-9		Engineering Risk–Benefit Analysis
OE	OE-10		Engineering System Analysis and Design
OE	OE-11		Engineering System Design Optimization
OE	OE-12		Engineering System Modeling and Simulation
OE	OE-13		Game Theory with Engineering Applications
OE	OE-14		Global Strategy and Technology
OE	OE-15		Infrastructure Systems Planning
OE	OE-16		Internet of Things Architecture and Design(OE)
OE	OE-17		Knowledge Management
OE	OE-18		Managing Innovation and Entrepreneurship
OE	OE-19		Network Management(OE)
OE	OE-20		Network Security and Cryptography Techniques(OE)
OE	OE-21		Planning for Sustainable Development
OE	OE-22		Project Management
OE	OE-23		Rural Technology & Community Development
OE	OE-24		Software Engineering
OE	OE-25		Supply Chain Management-Planning
OE	OE-26		Wireless Sensor Networks-Protocols and Applications(OE)

Summary of Credit Distribution									
Sem	HS	BS	ES	PC	PE	OE	PR	MC	CR
1	3	7	14	0	0	0	0	0	24
2	3	10	12	0	0	0	0	0	25
3	3	9	7	6	0	0	0	0	25
4	3	3	0	15	0	3	0	0	24
5	3	0	0	15	3	3	0	0	24
6	0	0	0	18	3	0	3	0	24
7	0	0	0	8	6	3	7	0	24
8	0	0	0	3	9	3	10	0	25
CR	15	29	33	65	21	12	20	0	195
%	7.7	14.9	16.9	33.3	10.8	6.2	10.3	0.0	100.0

Summary of Student Engagement in Hours									
Sem	HS	BS	ES	PC	PE	OE	PR	MC	Hrs
1	3	8	20	0	0	0	0	3	34
2	4	11	16	0	0	0	0	3	34
3	3	9	11	9	0	0	0	3	35
4	3	3	0	21	0	3	0	3	33
5	3	0	0	21	3	3	0	3	33
6	0	0	0	24	3	0	6	3	36
7	0	0	0	10	6	3	14	3	36
8	0	0	0	3	9	3	20	3	38
HRS	16	31	47	88	21	12	40	24	279
%	5.7	11.1	16.8	31.5	7.5	4.3	14.3	8.6	100

7. Structure of M Tech CSE Programme

To approve the following course structures of M Tech (CSE) and M Tech (CSE Information Security) programmes.

a. Course Structure of M Tech CSE programme

JES					
Curricula for 2 year M Tech Computer Science Engineering					
Batch 2018-20 M Tech I semester (M1)					
SN	**Sub Code**	**Subject**	**Contact hours**	**Credits**	**Remarks**
1	CS	Advanced Data Structures	3	3	
2	CS	Advanced Computer Networks	3	3	
3	CS	Advanced Database Systems	3	3	
4	CS	High performance Computer Architecture	3	3	
5	CS	DE-I	3	3	
6	CS	DE-II	3	3	
7	CS	DE-III	3	3	
8	CS	Software Systems Lab - I	4	2	
		Total	**25**	**23**	

JES					
Curricula for 2 year M Tech Computer Science Engineering					
Batch 2018-20 MTech II semester (M2)					
SN	**Sub Code**	**Subject**	**Contact hours**	**Credits**	**Remarks**
1	CS	Advanced Algorithms	3	3	
2	CS	Advanced Operating Systems	3	3	
3	CS	Advanced Software Engineering	3	3	
4	CS	Multimedia Systems	3	3	
5	CS	DE-IV	3	3	
5	CS	DE-V	3	3	

5	CS	DE-VI	3	3	
6	CS	Software Systems Lab - II	4	2	
		Total	**25**	**23**	

JES

Curricula for 2 year MTech Computer Science Engineering

Batch 2018-20 MTech III semester (M3)

SN	Sub Code	Subject	Contact hours	Credits	Remarks
3	CS	Seminar	0	2	
4	CS	Project, Part -I	24	12	
		Total	**24**	**14**	

JES

Curricula for 2 year MTech Computer Science Engineering

Batch 2018-20 MTech IV semester (M4)

SN	Sub Code	Subject	Contact hours	Credits	Remarks
3	CS	Project Seminar	0	2	
4	CS	Project, Part -II	28	14	
		Total	**28**	**16**	
		List of Electives			
		(To be updated from time to time)			
1	CS	Adv Computational Tech in Engg			
2	CS	Algorithmic Graph Theory			
3	CS	Analysis of Algorithms			
4	CS	Cognitive Sciences			
5	CS	Computation Theory and Applications			
6	CS	Computer Vision			
7	CS	Embedded System Design			
8	CS	Fault Tolerant Computing			
9	CS	Grid Computing			
10	CS	Information and Network Security			
11	CS	Intelligent Systems			
12	CS	Knowledge Discovery			
13	CS	Machine Learning			
14	CS	Mobile Computing			
15	CS	Parallel Computing			
16	CS	Pattern Recognition			
17	CS	Performance Evaluation of Computer Networks			
18	CS	Quantum Algorithms			
19	CS	Real Time Operating Systems			
20	CS	System and Network Security			
21	CS	Theory of Programming Languages			
22	CS	VLSI Algorithms			
23	EC	Advanced Wireless and Mobile			

		Communications			
24	EC	Digital CMOS design			
25	EC	Digital Signal Processors and Applications			
26	EC	Information and Coding Theory			
27	EC	VLSI Circuit and System Design			
28	EC	VLSI Modelling and Simulation			
29	EC	VLSI Testing			

Summary of Credits and Hours		
SEM	CR	HRS
Sem-1	23	25
Sem-2	23	25
Sem-3	14	28
Sem-4	15	32
Total	76	110

b. Course Structure of M Tech CSE (Information Security)

JES					
Curricula for 2 year M Tech Computer Science Engineering (Information Security)					
Batch 2018-20 M Tech CSE(IS) I semester (M1)					
SN	**Sub Code**	**Subject**	**Contact hours**	**Credits**	**Remarks**
1	CS	Advanced Data Structures	3	3	
2	CS	Advanced Computer Networks	3	3	
3	CS	Advanced Database Systems Security	3	3	
4	CS	**Cryptography and Information System Security**	3	3	
5	CS	DE-I	3	3	
6	CS	DE-II	3	3	
7	CS	DE-III	3	3	
8	CS	Software Systems Lab - I	4	2	
		Total	**25**	**23**	
JES					
Curricula for 2 year M Tech Computer Science Engineering (Information Security)					
Batch 2018-20 M Tech CSE(IS) II semester (M2)					
SN	**Sub Code**	**Subject**	**Contact hours**	**Credits**	**Remarks**
1	CS	Advanced Algorithms	3	3	
2	CS	Advanced Operating Systems	3	3	
3	CS	Advanced Software Engineering	3	3	
4	CS	**Digital Forensics**	3	3	
5	CS	DE-IV	3	3	
5	CS	DE-V	3	3	
5	CS	DE-VI	3	3	
6	CS	Software Systems Lab - II	4	2	

		Total	**25**	**23**	

JES					
Curricula for 2 year M Tech Computer Science Engineering (Information Security)					
Batch 2018-20 M Tech CSE(IS) III semester (M3)					
SN	**Sub Code**	**Subject**	**Contact hours**	**Credits**	**Remarks**
3	CS	Seminar	4	2	
4	CS	Project, Part -I	24	12	
		Total	**28**	**14**	

JES					
Curricula for 2 year M Tech Computer Science Engineering (Information Security)					
Batch 2018-20 M Tech IV semester (M4)					
SN	**Sub Code**	**Subject**	**Contact hours**	**Credits**	**Remarks**
3	CS	Project Seminar	4	2	
4	CS	Project, Part -II	28	14	
		Total	**32**	**16**	
		List of Electives			
		(To be updated from time to time)			
1	CS	Adv Computational Tech in Engg			
2	CS	Algorithmic Graph Theory			
3	CS	Analysis of Algorithms			
4	CS	Cognitive Sciences			
5	CS	Computation Theory and Applications			
6	CS	Computer Vision			
7	CS	**Control Systems Security**			
8	**CS**	**Cyber Warfare & Cyber Crime**			
9	CS	Embedded System Design			
10	CS	Fault Tolerant Computing			
11	CS	Grid Computing			
12	**CS**	**Incident Response & Event Management**			
13	CS	**Information and Network Security**			
14	CS	Intelligent Systems			
15	CS	Knowledge Discovery			
16	CS	Machine Learning			
17	CS	Mobile Computing			
18	CS	Parallel Computing			
19	CS	Pattern Recognition			
20	CS	**Penetration Testing**			
21	CS	Performance Evaluation of Computer Networks			
22	CS	Quantum Algorithms			
23	CS	Real Time Operating Systems			
24	CS	**Secure Enterprise Computing**			

25	CS	**Secure Software Design**			
26	**CS**	**Security Design & Architecture**			
27	**CS**	**Security investigation**			
28	CS	**Security Risk Analysis**			
29	**CS**	**Security Scripting**			
30	CS	System and Network Security			
31	CS	Theory of Programming Languages			
32	**CS**	**Threat & Vulnerability Analysis**			
33	CS	VLSI Algorithms			
34	EC	Advanced Wireless and Mobile Communications			
35	EC	Digital CMOS design			
36	EC	Digital Signal Processors and Applications			
37	EC	Information and Coding Theory			
38	EC	VLSI Circuit and System Design			
39	EC	VLSI Modelling and Simulation			
40	EC	VLSI Testing			

Summary of Credits and Hours		
SEM	CR	HRS
Sem-1	23	25
Sem-2	23	25
Sem-3	14	28
Sem-4	15	32
Total	76	110

8. Introduction of Massive Open Online Courses (MOOC)

It is proposed to introduce the following MOOC courses for B Tech (CSE/IT) and M Tech (CSE) students.

S.No	Course Name	Course Credits	Duration in weeks	Source	Stream
1	Social network	3	12	NPTEL	UG/PG
2	Introduction to Internet of Things	3	12	NPTEL	UG/PG
3	Artificial Intelligence: Knowledge Representation And Reasoning	3	12	NPTEL	UG/PG
4	Patent Law For Engineers And Scientists	3	12	NPTEL	UG/PG
5	Business analysis and data mining Modeling	3	12	NPTEL	UG/PG

9. To Allow Lateral Entry Students

It is proposed to admit diploma students or B Sc non-medical students to second year B Tech programme (B Tech CSE and B Tech IT) as lateral entry admission. The admissions will be regulated by the UGC/AICTE rules on the subject.

10. Approval of Feedback Analysis

A report on the analysis of the feedback received from stakeholders has been submitted by the Departmental Committee. It is proposed to accept the findings of the Committee. Findings of the committee are attached below.

ANALYSIS OF FEEDBACK FROM STAKEHOLDERS

Department of Computer Science & Engineering and Information Technology

Feedback from Stakeholders

The department has formal and informal mechanisms to obtain feedback from stakeholders through various committees, by using various feedback forms available in Annexure-IV to Annexure-IX.

1. FEEDBACK FROM ALUMNI

The alumni feedback was collected for all the UG, and PG students and following were the overall feedback received.
Feedbacks from alumni were obtained based on four important aspects such as academic standards, team leadership, curriculum for corporate industry sectors, ethical and communication skills on a scale of (excellent, well prepared, prepared, unprepared).

- Alumni suggested that they may be invited to the campus to interact with the students in- order to update them about the difficulties being faced in the IT industry and about latest technologies.
- Alumni felt that the library facilities need to be improved.
- Guidance on personality development and character building.
- Input towards attitude improvement (such as self-motivation, level of confidence)
- Encouragement received towards highest studies and career enhancement.
- Academic support extended by the faculty.
- Mentoring offered to the students follow up.
- Motivation for co-curricular and extra-curricular activities.
- Motivation and encouragement received towards higher studies in India and abroad were very good.
- Motivation towards curricular and extra-curricular activities was found to be good.
- Encouragements towards participation in research activities by the faculties of the department were found to be useful.
- Quality of academic resources is good.
- Efforts taken by department for all over grooming and personality development is excellent
- They are happy with the infrastructure provided by the Department.
- More internship programs can be conducted for better industrial exposure.

Following action is to be taken:

- These reforms are expected to improve innovations in the near future.
- All students were asked to carry out internships during the summer and winter vacation time.
- Necessary help was extended to interested students to carry out internships at a good place.
- Necessary facilities in the library are to be improved.

2. FEEDBACK FROM EMPLOYERS

Merits:

Overall the recruiters felt that the students are good in soft skills and fair in technical skills. A special note was made regarding the team building, interpersonal relationship and the good attitude of the students.

Demerits:

Certain domain specialization courses had to be conducted by the university such CSE & IT fundamentals can be taken much care such as Data Structures.
Feedbacks from the employer were obtained based on four important aspects such as academic standards, placements, curriculum for corporate industry sectors and communication skills on a scale of (Highly

Satisfied, Quite Satisfied, Satisfied, and not Satisfied).

- Employers generally felt that communication skill are good with our students and require improvement in technical knowledge.
- Exposure to software is to be improved.
- They also felt that they are less exposed to competitive exams.
- Students need to equip themselves with current practical knowledge in the concerned field for their sustainability.
- To meet this, students are encouraged to participate in the internship, workshops, training and industrial visit.
- Representatives of various industries give extremely useful feedback regarding the employability of the students and also their expectation from the students. Hence, any additional requirements that the industries may appreciate are provided by the Department.
- The Placement in –charge takes the feedback immediately after the recruitment from the HR team of the companies. So far the feedback conveys that the students are well prepared and groomed and present themselves with confidence, they are good at the fundamentals of ICT and their specialist domain. However, few of them lack confidence level because of their communication skills which the department to take not of it.

Following action is to be taken:

- Students must be apprised on the need of improving technical knowledge.
- Several add-on programmes are to be conducted so that students got benefitted.

3. FEEDBACK FROM PARENTS

- Courses needed to be more practical instead of theoretical.
- Strong alumni network among students.
- Parents expressed that updated information of students can be made available through message or by any other media.
- They expressed general satisfaction over academic instruction, hostel and academic of their wards.
- Parents suggested that the students must be involved in the research carried out in the department to update them about the latest technologies.
- Parents felt that the placement is to be made in the core companies.
- Companies should be training and internship in the 3rd year so that student can prepare themselves for the placement in the fourth year.
- Need to improve placements in the core and allied companies.
- Updating attendance details to the parents through SMS is found to be highly useful.
- Internet timing should be increased.
- Teachers must have a good relationship with the student.
- The Mentors are in close touch with the parents of the wards under their mentorship, communication on their test performances, general behaviour are updated to them. Academically weak students as perceived by parents and Mentor are addressed then and there through referring the same to the subject teachers.
- The same is reviewed by the Mentors in their meeting with mentee's

Following action is to be taken:

- Students are to be involved in projects.
- Two faculty members are to be trained by experts on soft skill training. The soft skill training classes have been included in the curriculum.
- Mentors have sent progress report of his/her mentee after every internal test and entries are made in a register in the department to ensure dispatch of reports on time.
- Some virtual Lab experiments have been included in the various ongoing lab courses.
- Spoken tutorial from IIT Bombay is to be started, and student enrolls for new courses.
- Most of the students are to be actively involved in the International conferences held in the department.

4. FEEDBACK FROM EXIT STUDENT

Merits:

Overall the students have given feedback that there was ample ambiance for them to improve their communication skill, personality development, self-motivation, confidence, good mentoring and good academic support extended by faculty.

Demerits:

Encouragement received in the aspect of higher studies and foreign education is required. Required more focus on practices which would improve the ability of the student to identify the problems in CSE and IT.

- Students expressed their satisfaction in understanding most of the subjects except a few where concepts are to be explained in detail.
- They suggested that more practical oriented teaching can be done.
- Students also suggested that subject teachers can present videos on latest technologies used and developments in their subject.
- Students requested for more problems to be given for practicing on each topic.
- Students felt that faculty members to deliver courses to their full potential and give importance to their laboratory sessions.
- Extended period request for lady students to enable to do project work and study in library during evening hours.
- The students suggested that a course on Cloud Computing and Security may be included in the list of Electives to support from their placement.
- More references are required for the subjects Advanced Database System.
- Overall content of the syllabus with respect to academic load to the student is good.
- Basic facility for doing experiments in each laboratory is good.
- Satisfied with the number of books in the library.
- Need coaching for competitive exams.
- More exposure to industries through industrial visits.

Following action is to be taken:

- Suggestions given by students are to be circulated among the faculty and faculty were advised to take steps for improvement.
- The faculty members must use video lecture and advanced references for their subject
- It is advised the junior faculty to attend classes headed by senior faculty to improve their subject knowledge and presentation skills.
- Faculty with exposure and competency to the particular lab is to be allotted with lab classes.
- HoD after reviewing the requests from the students, must recommend for an extended stay in Library.
- Special drive on GATE coaching should be conducted.
- Mock tests are to be periodically being conducted.
- Placement coordinator is asked to work with faculty to form groups as per the interests of students and identify companies.
- The subject WSN, Image processing Techniques, SNST has been included in the list of electives
- Teaching/ Laboratory facilities upgraded.
- Workshops on advanced topics are to be organized.
- Comments from the Students Feedback forms are to be given to the faculty to improve their teaching methodology.
- Extended timing to the Laboratories for the students during the project duration is advised.
- Exclusive Software Lab equipped with latest High-performance computing for the use of PG/ Research students.

Annexure-IV

Alumni Survey Form(Department of CSE&IT)

Date: __/__/

The faculty and students of Jaypee University of Information Technology, Waknaghat are dedicated to the continuous improvement of undergraduate engineering programs. The information that you provide through this survey will be very helpful in this process. We appreciate your help in filling out this survey.

1. **Name:.....Gender: M/F**
2. **Email Address:.....Contact No:.....**
3. **Year of Graduation:.....**
4. **Are you currently employed at this time: Yes [ ] No [ ]**
5. **Which of the following best describe your current position?**
   IT Professional [ ] Govt. Employ [ ] Business [ ] Higher Education [ ]
6. **Of the following, which best describe your job function?**
   Trainee [ ] Teacher [ ] R & D [ ] Engineer [ ] Consultant [ ] Manager [ ] Own Company [ ] Other (plz. specify).....
7. **Is your current employment in the same field as the degree you received from JUIT? Yes [ ] No [ ]**
8. **Qualification acquired after graduation from JUIT, if any**
   M.Tech. [ ] MBA [ ] MS [ ] PhD [ ]
   Institution Name.....
9. **Indicate your perception of preparedness at JUIT contributed to your employment and promotion in the job:**

	Excellent	Well prepared	Prepared	Unprepared
Core concepts of CSE and IT				
Knowledge of mathematics, science, and engineering				
Project undertaken involving system **design, model, and software tools**				
Working with a **team and leadership.**				
Professional and ethical responsibility developed				
Communication skills acquired				
Exposure to **societal and human** context				
Life-long learning				
Contemporary issues learnt				

10. **Would you recommend JUIT to friends/relatives? Yes [ ] No [ ]**

***Comments:.....**

Signature

Thank you for your cooperation and support.

Annexure-V

Employer/Parent Survey Form(Department of CSE)

Date: __/__/

Name:

Name of the Company/ Institution:

Sector to which it belongs: Finance/ Banking/ Medical/ Law/ Healthcare/ Education / Others

Designation:

Relationship with JUIT graduates: Employer ☐ Parent ☐

Dear Respondent,

We are carrying out formulation and review of our Vision, Mission, Programme Educational Objectives (PEOs) and Programme Outcomes (POs) of the department. Therefore, we request you kindly to provide us your valuable feedback on our programme that you might have observed. This will help us in tuning our programme to bridge the gap if any. Your help in providing feedback is greatly appreciated.

How do you rate the current potential of JUIT CSE alumni working in your organization on the following capabilities:	**Highly Satisfied**	**Quite Satisfied**	**Satisfied**	**Not Satisfied**	**Unable to Judge**
Application of **mathematical** foundations					
Application of computer science **theory and Practice**					
Application of **modeling & design** of computer-based systems					
Application of **engineering knowledge** in their domain					
Design and conduct experiments, analyze and interpret data					
Analyze the problem, subdivide into smaller tasks with interface for among components					
Complete the project (given task) within the specified **time frame and financial**					
Proposal of **original ideas** and solutions					
Design, implement, and evaluate hardware/software systems with **security features**					
Design, implement, and evaluate hardware/software systems with **assured quality and**					
Effective communication of engineering solution **to peers, customers and users**					
Understanding **of contemporary issues**					
lifelong learning and **team work**					

***Any Suggestions**

.....

Signature

Annexure-VI

Programme Outcomes (POs) Evaluation Form (Department of CSE)

Dear Examiner, we are carrying out formulation and review of the Programme Outcomes (POs) of the department. Therefore, we request you to provide us your valuable feedback.

Programme Outcomes (POs) for B. Tech. CSE

1. **Kindly tick according to your preference.**

Programme Outcomes (POs) of B. Tech. CSE	Excellent	Very Good	Satisfactory	Not Satisfactory	Unable to judge
PO-1: Strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.					
PO-2: Ability to **apply knowledge of mathematics, science, and engi**neering to real-life problem solving					
PO-3: Ability to **analyse, design, model, and develop complex software** and information management systems.					
PO-4: Ability to function **effectively within teams.**					
PO-5: Understanding of **professional ethical responsibility**					
PO-6: Ability to **communicate effectively**, both in writing and oral.					
PO-7: Understanding the impact of Computer Science and Engineering solutions in the **societal and human context.**					
PO-8: Ability to engage in **life-long learning.**					
PO-9: Knowledge of **contemporary issues.**					

2. **Name:** ----------
3. **Designation:**.....
4. **Affiliation:**.....
5. **Any suggestion regarding the POs attainment.**

.....

.....

Dated:

Signature

Thank You Very Much

Annexure-VII

Programme Exit Form (Department of CSE)

Dear Student,

Now that you have undergone BTech programme, we would like that you provide us feedback on the levels of achievement of Programme Outcomes (POs). Your feedback will be valuable for making changes in the programme to meet your expectations and future career. **Please put X mark in the appropriate box as per your perception.**

Programme Outcomes (POs) of B. Tech. In CSE	Excellent	Very Good	Satisfactory	Not Satisfactory	Unable to Judge
PO-1: Strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.					
PO-2: Ability to **apply knowledge** of mathematics, science, and engineering to real-life problem solving					
PO-3: Ability to **analyze, design, model, and develop** complex software and information management systems					
PO-4: Ability to function effectively within **teams**					
PO-5: Understanding of professional **ethical responsibility**					
PO-6: Ability to **communicate effectively**, both in writing and oral.					
PO-7: Understanding the impact of Computer Science and Engineering solutions in the **societal and human** context.					
PO-8: Ability to engage in **life-long learning**					
PO-9: Knowledge of **contemporary issues**					

1. **Name:** ----------
2. **Roll No**.....
3. **Placement Secured: Yes [ ] No [ ]**
4. **Employer Name:** .....
5. **Planning to pursue Higher Studies: MBA [ ] M.Tech. [ ] MS [ ]**
6. **Any Suggestions**

Dated: **Signature**

Thank You Very Much

Annexure-VIII

Vision-Mission & PEO Survey Form (Department of CSE)

Dear Respondent,

We are carrying out formulation and review of the Vision, Mission and Programme Educational Objectives (PEOs) of the department. Therefore, we request you kindly to provide us your valuable feedback.

Kindly tick according to your perception.

Vision and Mission	Excellent	Very Good	Satisfactory	Not Satisfactory	Unable to Judge
Vision: To become a **Center of Excellence** in the computer sciences and information technology discipline with a **strong research and teaching environment** that adapts swiftly to the challenges of the 21st century.					
Mission-1: To provide **qualitative education** and generate new knowledge by engaging **in cutting-edge research** and by offering state-of-the-art undergraduate, postgraduate and doctoral programmes, leading to careers as Computer and IT professionals in the widely diversified domains of industry, government and academia.					
Mission-2: To **promote a teaching and learning process** that yields advancements in state-of-the-art in computer science and information technology, resulting in integration of research results and innovations into other scientific disciplines leading to new technologies and products.					
Mission-3: To **harness human capital** for sustainable competitive edge and social relevance by inculcating the philosophy of continuous learning and innovation in Computer Science and IT.					

Kindly tick according to your perception.

Programme Educational Objectives (PEOs) of B. Tech. CSE	Excellent	Very Good	Satisfactory	Not Satisfactory	Unable to Judge
PEO-1: To bring the **physical, analytical and computational approaches** of CSE to bear on the challenges they take on, abstracting essential structure, recognizing sources of uncertainty, and applying appropriate models, technical tools, and evaluations to develop their solutions.					
PEO-2: To bring to their careers the **self-assurance, integrity, and technical strengths** that drive innovation and the communication and collaboration skills to inspire and guide the groups they work with in bringing their ideas to fruition.					
PEO-3: To develop abilities and talents leading to **creativity and productivity** in fields and professions beyond the regular CSE curriculum.					
PEO-4: To promote **life-long self-learning** abilities to remain professionally effective to the society at large.					
PEO-5: To promote among student graduates the ability to gain **multidisciplinary knowledge** through projects and industrial training, leading to a sustainable competitive edge in R&D and meeting societal needs.					
PEO-6: To inculcate group work and **team management** skills with cross-cultural etiquettes, promoting knowledge transfer leading to conceptualization and delivery of projects with varied complexity.					
PEO-7: To sensitize students towards issues of **social relevance**, openness to other international cultures and to introduce them to professional ethics and practice.					

6. **Name:** ----------
7. **Stakeholder Type: Parent [ ] Alumni [ ] Employer [ ] External Examiner [ ]**
8. **Any suggestion regarding Vision, Mission and PEOs of the department.**----------

---

Dated:

Signature

Thank You Very Much

Annexure-IX
List of PEO and PO

B Tech CSE - Programme Educational Objectives

We focus on the following objectives to realize our vision.

PEO-1: Engineering Ethos To bring the physical, analytical and computational approaches of CSE to bear on the challenges they take on, abstracting essential structure, recognizing sources of uncertainty, and applying appropriate models, technical tools, and evaluations to develop their solutions.
PEO-2: Leadership To bring to their careers the self-assurance, integrity, and technical strengths that drive innovation, and the communication and collaboration skills to inspire and guide the groups they work with in bringing their ideas to fruition.
PEO-3: Versatility To develop abilities and talents leading to creativity and productivity in fields and professions beyond the regular CSE curriculum.
PEO-4: Engagement To promote life-long self learning abilities to remain professionally effective to the society at large.
PEO-5: Diversification To promote among student graduates the ability to gain multidisciplinary knowledge through projects and industrial training, leading to a sustainable competitive edge in R&D and meeting societal needs.
PEO-6: Projects To inculcate group work and team management skills with cross-cultural etiquettes, promoting knowledge transfer leading to conceptualization and delivery of projects with varied complexity.
PEO-7: Ethics and Attitudes To sensitize students towards issues of social relevance, openness to other international cultures and to introduce them to professional ethics and practice.

B Tech IT – Programme Educational Objectives

We focus on the following objectives to realize our vision.

PEO-1: To provide student graduates with a solid foundation in mathematical, scientific and engineering fundamentals required to develop the problem solving ability.
PEO-2: To prepare student graduates for a successful career with effective communication skills, teamwork skills and work with values that meet the diversified needs of industry, academia and research.
PEO-3: To train students in comprehending, analyzing, designing and creating novel products and technologies that provide solution frameworks to real-world problems.
PEO-4: To promote awareness among student graduates towards issues of social relevance and introduce them to professional ethics and practice.
PEO-5: To inculcate in student graduates the ability to gain multidisciplinary knowledge through projects and industrial training, providing a sustainable competitive edge in R&D and meeting industry needs.
PEO-6: To develop self-learning ability in graduates by inculcating the philosophy to continuously learn, innovate and contribute to creation of new knowledge for the benefit of the society at large.
PEO-7: To inculcate in graduates the qualities of leadership for technology innovation and entrepreneurship.

B Tech CSE- Programme Outcomes (POs):- A graduate of the Computer Science and Engineering Program will demonstrate

PO-1: Strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.
PO-2: Ability to apply knowledge of mathematics, science, and engineering to real-life problem solving.
PO-3: Ability to analyse, design, model, and develop complex software and information management systems.
PO-4: Ability to function effectively within teams.
PO-5: Understanding of professional ethical responsibility.
PO-6: Ability to communicate effectively, both in writing and oral.
PO-7: Understanding the impact of Computer Science and Engineering solutions in the societal and human context.
PO-8: Ability to engage in life-long learning.
PO-9: Knowledge of contemporary issues.

B Tech IT- Programme Outcomes (POs):-

A graduate of the Information Technology Program will demonstrate:

PO-1: Ability to acquire and apply knowledge of science and engineering fundamentals in problem-solving.
PO-2: Acquire in depth technical competence in a specific information technology discipline.
PO-3: Ability to undertake problem identification, formulation and providing an optimum solution.
PO-4: Ability to utilize a systems approach to design and evaluate operational performance.
PO-5: Understanding of the principles of inter-disciplinary domains for sustainable development.
PO-6: Understanding of professional & ethical responsibilities and commitment to them.
PO-7: Ability to communicate effectively, not only with engineers but also with the community at large.
PO-8: Ability to function effectively as an individual and in a group with the capacity to be a team leader.
PO-9: Understanding of the social, cultural, global and environmental responsibilities as a professional engineer.
PO-10: Recognizing the need to undertake life-long learning, and possess/acquire the capacity to do so.

Chairperson

Dr. Yashwant Singh, Associate Professor

Members

Dr. Hemraj Saini, Associate Professor

Dr. Amit Kumar Singh, Assistant Professor Senior Grade

Prof. Dr. S.P.Ghrera, FBCS(Fellow British Computer Society), SMIEEE
Ph. D(CSE), MBA(HR & IR), ME(Hons) Computer Science, B Sc Engineering(Hons)

Head of Department & Professor
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Tele: 01792-239340, 9816146980, 9459973880

----- Forwarded by sp.ghrera/Juit on 11/17/2017 10:29 AM -----

From: Mayank Dave <mdave67@gmail.com>
To: sp.ghrera/Juit@juit.ac.in, amitk.shrivastava/Juit@juit.ac.in, rakesh.bassi/Juit@juit.ac.in
Date: 11/16/2017 10:20 PM
Subject: Re: Fw: BOS Meeting on 18 Nov and agenda points

Dear Sir,
1. PEOs are too many. These should be maximum 4.
2. POs may be 10. But 9 may be acceptable.
3. Gaming Course looks impractical to teach. The syllabus is too much. What about the associated labs.
4. In Real World Applications of Algorithms - You have left out too many algorithms like Routing Algorithms, Computer Graphic Algorithms, Machine Learning Algorithms, Concurrency Control Algorithms, Gaming Algorithms? I think the course has no meaning. Rather you may have two Advanced Algorithms courses with practical component as well.
5. How do you decide credits for a course? Similar to all programmes of the institute or specific to CS / IT?
6. How big are your hostels/classrooms/seminar halls/conference halls/tutorial rooms to accommodate 40% increase strength of students. What is the plan for faculty recruitment? Please do not increase strength in a haste.
7. Survey Forms are okay.

I will try to reach by 10am on 18th Nov.

Regards

Mayank Dave
NIT Kurukshetra
Mob: 9896408121

On Mon, Nov 13, 2017 at 9:55 AM, < sp.ghrera/Juit@juit.ac.in > wrote:
Revised copy of agenda points for the forthcoming BOS meeting on 18th Nov 2017 is attached please. Kindly send your comments, suggestions and recommendations.

Prof. Dr. S.P.Ghrera, FBCS(Fellow British Computer Society), SMIEEE
Ph. D(CSE), MBA(HR & IR), ME(Hons) Computer Science, B Sc Engineering(Hons)

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----- Forwarded by sp.ghrera/Juit on 11/13/2017 09:54 AM -----

Fr om : sp.ghrera/Juit

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Cc : rakesh.bassi/ Juit@juit.ac.in , samirdev.gupta/ Juit@juit.ac.in , vinod.kumar/ Juit@juit.ac.in

Da te: 11/07/2017 01:10 PM

Su bje ct: BOS Meeting on 18 Nov and agenda points

[attachment "Agenda_for_BOS_Meeting_Nov_2017.docx" deleted by sp.ghrera/Juit]
Dear Sirs,
Meeting of the Board of Studies in the department of CSE and IT is scheduled at 11:30 hrs on 18 th November, 2017 at Board Room, JUIT Waknaghat. The agenda points are enclosed. You are also requested to make it convenient to attend the meeting. In case you are not able to attend the meeting you may send your views and suggestions by mail before 15 th November, 2017. You may send your arrival details in the following e-mail address.

Amol Vasudeva, (Coordinator, Board of Studies meeting)
amol.vasudeva@juit.ac.in
amol.vasudeva123@gmail.com
M: 9805116716

With Regards
Prof. Dr. S.P.Ghrera, FBCS(Fellow British Computer Society), SMIEEE
Ph. D(CSE), MBA(HR & IR), ME(Hons) Computer Science, B Sc Engineering(Hons)

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Dear Prof.Ghrera,

Good morning.

Thanks for your invitation for the meeting of the BoS. It is regretted that I may not be in a position to attend the meeting on the said date due to some prior engagement.

Anyways, I am sending my considered opinion through the following points to be considered in the meeting of this BoS:

Agenda Item No.1:
I am strictly not in favour of the enhancing the number of seats from 180 to 240. It leads to the overall degradation of the quality of the intake as well as the output of the course too. Therefore, the no. of seats should not be increased at all.

Agenda Item No.2:
Agreed with the proposal.

Agenda Item No.3:
Agreed with the proposal.

Agenda Item No.4:
The syllabus for the elective "Computer Game Design" is too heavy and it may not be possible for the students as well as the teachers to complete the entire syllabus in the specified time framework. Therefore,some of it's content should be scaled down. The scaling down process can be deliberated with the members present in the meeting.

Agenda Item No.5:
The findings seem to be acceptable.

Agenda Item No.6:
There are some mistakes in the calculations of totaling of numbers of the credits/hours in some semesters in the syllabi of B. Tech. CSE/IT. Please get those corrected. Rest can be deliberated in the meeting.

With regards,

Dr. Manu Sood
Professor,
Department of Computer Science &
Director
University Institute of Information Technology
Himachal Pradesh University
Shimla (H.P.) - 171 005
Mob: +91-941-830-9695

On Sunday, 12 November 2017 8:30 PM, "sp.ghrera/Juit@JUIT.AC.IN" <sp.ghrera/Juit@JUIT.AC.IN> wrote:

Revised copy of agenda points for the forthcoming BOS meeting on 18th Nov 2017 is attached please. Kindly send your comments, suggestions and recommendations.

Prof. Dr. S.P.Ghrera, FBCS(Fellow British Computer Society), SMIEEE
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----- Forwarded by sp.ghrera/Juit on 11/13/2017 09:54 AM -----

From: sp.ghrera/Juit

To: padam.kumar@jiit.ac.in, mdave@nitkkr.ac.in, m.dave@ieee.org, soodm_67@yahoo.com, pthakur@csc.com, rkumar@thapar.edu, sunil.bhooshan@juit.ac.in, ashok.gupta@juit.ac.in, karanjeet.singh@juit.ac.in, karan_jeet@yahoo.com, pb.barman@juit.ac.in, sudhir.syal@juit.ac.in, anupriya.kaur@juit.ac.in, cs_it@juit.ac.in

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Date: 11/07/2017 01:10 PM

Subject: BOS Meeting on 18 Nov and agenda points

[attachment "Agenda_for_BOS_Meeting_Nov_2017.docx" deleted by sp.ghrera/Juit]
Dear Sirs,
Meeting of the Board of Studies in the department of CSE and IT is scheduled at 11:30 hrs on 18 th November, 2017 at Board Room, JUIT Waknaghat. The agenda points are enclosed. You are also requested to make it convenient to attend the meeting. In case you are not able to attend the meeting you may send your views and suggestions by mail before 15 th November, 2017. You may send your arrival details in the following e-mail address.

Amol Vasudeva, (Coordinator, Board of Studies meeting)
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With Regards

Prof. Dr. S.P.Ghrera, FBCS(Fellow British Computer Society), SMIEEE
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Minutes of the Meeting

2017 Department of Computer Science & Engineering and Information Technology Engineering

Minutes of the meeting of Board of Studies in Computer Science & Engineering Department held on 18th November 2017 at 11:30 AM in the Board Room, Jaypee University of Information Technology, Waknaghat. The following members were present:

1. Prof S P Ghrera, HOD CSE/IT Dept (Chairperson)
2. Dr. Vivek Sehgal
3. Dr. Hemraj Saini
4. Dr. Pardeep Kumar
5. Dr. Pradeep Kumar Singh
6. Dr. Shailendra Shukla
7. Dr. Ravindra Bhatt
8. Dr. Amit Kumar Singh
9. Dr. Suman Saha
10. Dr. Punit Gupta
11. Dr. Yugal Kumar
12. Prof Dr. Mayank Dave, NIT Kurukshetra
13. Prof Dr. Manu Sood, Director, UIIT, HP University
14. Nominees from the departments of Electronics & Communication Engineering, Civil Engineering, Bio-Technology/Bio-Informatics, Mathematics, Physics, and Humanities & Social Sciences.

RESOLUTIONS:

1. It was suggested by Prof Mayank Dave (external member) to increase the intake of B Tech CSE and B Tech IT only if there is a sufficient number of hostels, classrooms, tutorial rooms, and laboratories to accommodate them. He also suggested increasing the number of faculty members.

Since new classrooms and labs have been developed, CSE/IT department is now in a position to accommodate the increased intake of students. Moreover, the department of CSE/IT has recently recruited six faculty members and is still in the process of advertising for more recruitment.

In view of the above plan, it was resolved to increase the intake of B Tech (CSE) students (from 180 to 240) from 2018 batch onwards.

2. It was also resolved to increase the intake of B Tech IT students (from 30 to 60) from 2018 batch onwards.
3. It was resolved to change the title of the programme M Tech CSE (Software System Security) to M Tech CSE (Information Security) as suggested by last Academic Council, and to offer the course from July 2018.
4. It was resolved to introduce following three elective courses for B Tech CSE/IT.
    i. Computer Game Design
    ii. Design and Analysis of Real World Algorithms
    iii. Mobile and Distributed Computing

    It was suggested by Prof Manu Sood and Prof Mayank Dave (external members) to reduce some contents of the course "Computer Game Design," in accordance with 42 lectures. Prof Mayank Dave also suggested including Routing Algorithms, Computer Graphic Algorithms, Machine Learning Algorithms, Concurrency Control Algorithms, and Gaming Algorithms in the course "Design and Analysis of Real World Algorithms." It was resolved that Mr. Puneet Jain and Dr. Suman Saha have already amended the syllabuses of the courses “Computer Game Design” and “Design and Analysis of Real World Algorithms”, respectively, as suggested, and the same have been brought up for consideration. The amended syllabuses for both of the above courses were accepted and recommended (the updated and approved course descriptions for both of the courses are given in Annexure I and II).
5. It was resolved to approve the changes in the course structure of B Tech (CSE) and B Tech (IT) programs as per details given on the agendas 5 and 6, respectively. It was also resolved to allow B Tech (CSE/IT) elective courses to be offered earlier and facilitate Choice-Based Credit System (CBCS) compliance.
6. It was resolved to approve the course structure of M Tech (CSE) and M Tech (CSE Information Security) programmes as per details given on the agenda 7.
7. It was resolved to introduce the Massive Open Online Courses (MOOC) for B Tech (CSE/IT) and M Tech (CSE) students as per details given on the agenda 8.
8. It was resolved to admit Diploma/BSc non-medical students to second year B Tech (CSE) and B Tech (IT) programmes as lateral entry admission (as per UGC/AICTE guidelines).

9. The recommendations of "report on the analysis of the feedback received from stakeholders" were approved in the meeting.

10. Dr. Sudhir Cyal (nominee from BI/BT dept) requested to introduce a new elective course on "Python Programming" for BI/BT students.

    Considering the advantages, flexibility, and demand of Python language in solving a wide variety of biological problems, it was resolved to offer "Python Programming" as an elective course for BI/BT students as per the course description attached in Annexure III.

(HOD CSE/IT)

Annexure I

"Computer Game Design (17B1WCI812)"

Course description:

This course is an introduction to current and future technologies for computer game design and scripting. Topics include graphics, game scripting, game engines, motion control, narrative in games, game interfaces, artificial intelligence, music and sound, "Serious Games" and social and interface issues of game development.

Students enrolled in Computer Game Design program will have the opportunity to learn techniques for using interactive storytelling to design games. Program coursework exposes students to design processes such as planning, prototype development, and testing. Students also learn about theoretical and conceptual understanding of the field of game design, along with practical exposure to the process of creating a game. The coursework describes the deepest and most fundamental principles of game design.

Course Objectives:

In this class

- We will discuss games and game design. It includes the history and philosophy of games, the game production process.
- We will discuss introduction to the electronic game design and development careers
- We will discover what the components of games are, and what parts of games are influenced by their design.
- We will learn several ways to approach the design of a game, and processes and best practices for prototyping, playtesting and balancing a game after it has been designed.

Student Learning Outcomes:

By the end of the Game Design course, students will demonstrate proficiency with:

- Identifying the fundamental skills and techniques of game design
- Applying the fundamental skills and techniques of game design in the construction of a game prototype
- Refining a game prototype through a productive cycle of play testing
- Participating in the iterative process in a mutually respectful, collaborative team environment
- Executing a well-planned presentation that includes an analysis of the final product and game design process
- You will be familiar with the (relatively small) body of work that is accepted in the game industry as the theoretical foundation of game design.
- You will also be comfortable enough in processes to start designing your own games, as well as critically analyzing other people's games.

Course Syllabus

Topics	HRS
1 The Role of the Game: An Advocate for the Player, An Advocate for the Player, Passions and Skills, A Play centric Design Process, Designers You Should Know, The Iterative Design Process, Designing for Innovation, Conclusions.	4
2 The Structure of Games: Go Fish versus Quake, Engaging the Player, What is a Puzzle? The Sum of the Parts, Defining Games, Beyond Definitions, Conclusions.	4
3 Working with Formal Elements: Players, Persuasive Games, Objectives, Procedures, Resources, Conflict, Boundaries, Outcome, Conclusions.	4
4 Working with Dramatic Elements: Challenge, Play, Premise, Character, Story, The Two Great Myths of Interactive Storytelling, World Building, The Dramatic Arc, Conclusions.	4
5 Working with System Dynamics: Games as Systems, System Dynamics, Deconstructing Set, Interacting with Systems, A Conversation with Will Wright, Tuning Game Systems, Table of Contents ix Conclusions.	4
6 Conceptualization: Coming Up With Ideas, Brainstorming Skills, Alternate Methods, Editing and Refining, Electronic Arts Preproduction Workshop, Turning Ideas into a Game , Where Do Game Ideas Come From?, Conclusion.	4
7 Prototyping: Methods of Prototyping, Catastrophic Prototyping and Other Stories, Prototyping Your Original Game Idea, The Design Evolution of Magic: The Gathering, Making the Physical Prototype Beer, Beyond the Physical Prototype, Conclusions.	4
8 Digital Prototyping: Types of Digital Prototypes , Using So ware Prototypes in Game , Prototyping for Game Feel , Designing Control Schemes, Prototyping Cloud , Selecting Viewpoints, x Table of Contents Effective Interface Design, Prototyping Tools, Conclusions.	4
9 Play testing: Play testing and Iterative Design, Recruiting Play testers, Conducting a Play testing Session, Methods of Play testing, 256 Why We Play Games, The Play Matrix, Taking Notes, Basic Usability Techniques, Data Gathering, Test Control Situations, How Feedback from Typical Gamers Can Help Avoid Disappointing Outcomes, Play testing Practice ,Conclusions.	4
10 Functionality, Completeness, and Balance: What Are You Testing For?, Is Your Game Functional?, Is Your Game Internally Complete?, Is Your Game Balanced? , A Conversation with Rob Pardo, Techniques for Balancing Your Game, Conclusions.	3
11 Stages of Development: Stages Defined, From Classroom to Console: Producing flow for the PlayStation, How to Make a Project Plan, Business Opportunities for Independents, Conclusions.	3
Total Hours: 42	

Evaluation scheme:

Mid Sem-1	– 15 marks	
Mid Sem-2	– 25 marks	
Mid Sem-3	– 35 marks	
Internal Assessment(Assignments/Quizzes/attendance)		– 25 marks
Total	**100 marks**	

Suggested Readings

The following background readings provide more detailed coverage of the course material:

Text Book(s)

- Game Design Workshop, 3rd Edition: A Playcentric Approach to Creating Innovative Games is a book on game design by Tracy Fullerton, originally published by CMP Books.

Reference Book(s)

- **A Theory of Fun for Game Design, by Koster.** This book shows the similarities between game design and education, with a good discussion of the concept of Flow. Half text and half cartoons, this short book flows nicely and can be read in the afternoon or two.
- **Understanding Comics: The Invisible Art, by McCloud.** While this book claims to be about comics, many of the lessons within can be applied to game design and other forms of art. It also happens to be a comic book itself, and fun to read.

Annexure II

"Design and Analysis of Real World Algorithms"

This course covers how algorithms and theory are used in "real-world" applications. The course will cover both the theory behind the algorithms and case studies of how the theory is applied.

Objective of the course:

Interesting algorithms arise in many real world applications in a broad variety of areas. Getting a better understanding of where and how these algorithms are used can be valuable in many ways. It can help in the teaching of algorithms by supplying up-to-date examples of the contexts in which algorithms are used. It can help make effective use of algorithms in industry by allowing better sharing of experiences. It can help motivate new problems to consider, or can improve our understanding of the models and the assumptions we make in various problem domains. It can give us a better feeling of what it takes to have industry use algorithms, and it can help us better understand what factors are important in the design of algorithms.

Outcomes:

Students will learn:

- What is the process of getting algorithms used in real world?
- How important are constants and how important are asymptotics in practice?
- Are there application domains in which algorithms should be playing a larger part?
- How do we deal with the tension between (a) creating broadly useful algorithms for generic problems, and (b) meeting the needs of a specific client?
- The real world is noisy. How should algorithms deal with noisy input data?

Course Syllabus

Topics	HRS
1. **Compression algorithms**: Information Theory, Huffman/Arithmetic/Gamma Codes, Context Coding/PPM, Lempel Ziv/Gzip/Burrows Wheeler, Graph Compression	5
2. **Linear programming & game development**: Flow problems as Linear programs Simplex, Elipsoid and Interior point methods, Airline crew scheduling, Sudoku, Chess,	6

	Candy crush	
3.	**Cryptographic algorithms**: One-way functions, basic protocols, Number theory review: groups, fields, Galois fields, Private key cryptosystems (Block Ciphers, Rijdael), Public key cryptosystems (SSL, RSA, ElGamal, Diffie-Hellman), Kerberos and Digital Cash)	**5**
4.	**Network Algorithms:** Packet forwarding, switch scheduling, traffic shaping, bandwidth partitioning, buffer management and congestion control	**6**
5.	**Machine learning algorithms:** Decision Trees, Naive Bayes , Ordinary Least Squares Regression, Logistic Regression, Support Vector Machines	**6**
6.	**Algorithms for Big Data:** MapReduce, Approximate Counting, Count-min Sketch, Random Walks, PageRank	**4**
7.	**Geometry and graphics:** Convexity, triangulation, sweeping, spatial partitioning, Voronoi Diagram, Robot Motion Planning	**5**
8.	**Spectral Algorithms:** Low rank Approximations, Random projections, Graph sparsification, Community detection	**5**
	Total	**42**

Evaluation scheme:

Evaluation scheme is designed to promote and test higher level thinking skills through holistic and continuous evaluation and de-emphasis rote learning. Written exams will be designed and conducted as close/open book(s), close/open notes tests. One of the minor tests will be designed and conducted as a take home test and will be based on individual's research and literature survey. Evaluation scheme will have the following components:

T1	15
T2	25
T3	35
Teachers Assessment (i, ii, and iii)	25
(i) Mini Project	10
(ii) Quiz and Assignment	10
(iii) Attendance	5
Total	100

Books:

1. Algorithms:- S. Dasgupta, C. Papadimitrou, U. Vazirani
2. Network Algorithms:- Robert Tarzan
3. Computational Geometry: Algorithms and Applications:- Mark de Berg
4. Randomized Algorithm: Raghavan

Annexure III

"Introduction to Python Programming"

Course Credits: 3 (3-0-0)

Course Objective

The aim of this subject is to provide students with an understanding of the role computation can play in solving problems. The course covers the fundamental principles of Object-Oriented Programming and information processing techniques through Python programs. Students will solve problems, explore real-world software development challenges, and create practical and contemporary applications.

Outcomes

- Provide an understanding of the role computation can play in solving problems.
- Help students, including those who do not plan to major in Computer Science and Electrical Engineering (like BI and BT), feel confident of their ability to write small programs that allow them to accomplish useful goals.
- Position students so that they can compete for research projects and excel in subjects with programming components.

Teaching Methodology

The class will combine lectures and labs. Lectures will focus on learning the concepts and principles, and in lab sessions students will have to work individually as well as in groups who will jointly be assigned combined tasks on related problems. Focus will be on problems in the application domain of other courses being studied by the students. Overall the course will adopt a problem-solving approach using Python language. The expectation is that students will become self-sufficient in learning any programming language on their own thereafter. The topics will be discussed in an integrated manner following the principles of problem based learning.

Tools and Techniques

- You will be using the Python programming language, version 3.5.
- You are not expected to have any prior programming knowledge - this course is intended for students who have little to no experience with any programming language.

	Topics	Hrs
1	**Branching and Iteration:** Loops, Multiple assignment, Updating variables, The while statement, Break, etc	2
2	**String Manipulation, Guess and Check, Approximations, Bisection:** String manipulation, Guess and check algorithms (e.g: find Square Root etc), Approximate solutions (e.g Successive approximation), Bisection method	3

3	**Decomposition and Abstractions:** Divide and conquer (modules), Abstraction	3
4	**Tuples, Lists, Dictionaries, Illustrative programs:** Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension;Illustrative programs: selection sort, insertion sort, mergesort, histogram	4
5	**Files, Modules, Packages:** Files and exception: text files, reading and writing files, format operator. Packages. Illustrative programs: word count, copy file.	3
6	**Testing, Debugging, Exceptions, Assertions:**Unit testing framework (unittest),debugger for Python program (pdb), Handling an exception	2
7	**Object Oriented Programming:** Classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects. OOP, continued: inheritance, polymorphism, operator overloading, abstract classes	8
8	**Multithreading:** Thread, Starting a thread, Threading module, Synchronizing threads, Multithreaded Priority Queue	3
9	**Illustrative programs (examples):** Sorting and Searching, Regular expressions (Match function, Search function, Matching vs Searching, Modifiers Patterns). Networking (Socket, Socket Module, Methods, Client and server, Internet modules)	8
10	**GUI Programming:** Introduction, Tkinter programming, Tkinter widgets	2
	Total	42

Evaluation Scheme:

Test 1 15 Marks
Test2 25 Marks
Test3 35 Marks
Internal Assessment (Continuous Evaluation) [Assignments, Surprise/Announced Quizzes and Attendance] 25 Marks
Total 100 Marks

Reference Books

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705.
2. Chun, Wesley. Core python programming. Vol. 1. Prentice Hall Professional, 2001.
3. Zelle, John M. Python programming: an introduction to computer science. Franklin, Beedle & Associates, Inc., 2004.
4. Gold, Steve. "Python: Python Programming Learn Python Programming In A Day-A Comprehensive Introduction To The Basics Of Python & Computer Programming." (2016).

Web References

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/index.htm

MEMBERS OF BOARD OF STUDIES (2017)

Department of Computer Science & Engineering and Information Technology

1. Chairperson: Prof S P Ghrera, HOD, CSE Dept.

2. Members :

   i. Dr Vivek Sehgal

   ii. Dr Hemraj Saini

   iii. Dr Pardeep Kumar

   iv. Dr Pradeep Kumar Gupta

   v. Dr Pradeep Kumar Singh

   vi. Dr Rajni Mohana

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   ix. Dr Shailendra Shukla

   x. Dr Suman Saha

   xi. Dr Yugal Kumar

   xii. Ravindara Bhatt

3. Nominees from the departments of ECE, Civil, Mathematics, Physics, BT/BI, and Humanities and Social Sciences:

   i. Prof Sunil Bhooshan, HOD, Department of Electronics and Communication

   ii. Prof A K Gupta, HOD, Department of Civil Engineering

   iii. Prof Karanjeet Singh, HOD, Department of Mathematics

   iv. Prof P B Burman, HOD, Department of Physics

   v. Prof Sudhir Kumar Syal, HOD, Department of Biotechnology and Bioinformatics

   vi. Prof Anupriya Kaur, HOD, Department of Humanities and Social Sciences

4. External Experts :

   i. Prof Manu Sood, Director, UIIT, HP University

   ii. Prof Mayank Dave, NIT Kurukshetra dave 18.11.17

   iii. Prof Dr Padam Kumar, Dean R, I & D, JIIT, Noida

5. Representative from industry/corporate sector

   i. Sh Prantik Thakur, Service Delivery Manager, CSC, Indore

6. Postgraduate Meritorious Alumnus:

   i. Mr Rajkumar Tekchandani, Asst Prof, Thapar University, Patiala.

HOD CSE/IT