CREDIT DISTRIBUTION STRUCTURE FOR M.TECH ADMISSION BATCH 2016-17

1ST SEMESTER				2ND SEMESTER			
CODE	**SUBJECT**	**L-T-P**	**CREDIT**	**CODE**	**SUBJECT**	**L-T-P**	**CREDIT**
	COMPUTATIONAL METHODS AND TECHNIQUES	3-1-0	4		SPECILIZATION CORE I	3-1-0	4
	INTERNET OF THINGS	3-1-0	4		SPECILIZATION CORE II	3-1-0	4
	BRANCH SPECILIZATION CORE -I	3-1-0	4		ELECTIVE -I (SPECILIZATION RELATED)	3-1-0	4
	BRANCH SPECILIZATION CORE- II	3-1-0	4		ELECTIVE -II (DEPATMENTAL REALTED)	3-1-0	4
	BRANCH SPECILIZATION CORE- III	3-1-0	4		ELECTIVE- III (FROM ANY DEPATMENT)	3-1-0	4
CREDITS (THEORY)			**20**	**CREDITS (THEORY)**			**20**
PRACTICALS/SESSIONALS				**PRACTICALS/SESSIONALS**			
	LAB I	0-0-4	4		LAB II	0-0-4	4
					DESIGN PROJECTS	0-0-4	4
CREDITS (PRACTICALS/SESSIONALS)			**4**	**CREDITS (PRACTICALS/SESSIONALS)**			**8**
TOTAL SEMESTER CREDITS			**24**	**TOTAL SEMESTER CREDITS**			**28**
TOTAL CUMULATIVE CREDITS			**24**	**TOTAL CUMULATIVE CREDITS**			**52**

3RD SEMESTER				4TH SEMESTER			
CODE	**SUBJECT**	**L-T-P**	**CREDIT**	**CODE**	**SUBJECT**	**L-T-P**	**CREDIT**
	RESEARCH METHODOLOGY	3-1-0	4				
	IPR (INTELLECTUAL PROPERTY RIGHTS)	3-1-0	4				
CREDITS (THEORY)			**8**				
PRACTICALS/SESSIONALS				**PRACTICALS/SESSIONALS**			
	PRE DESSERATION WORK EVALUATION		9		DESSERATION EVALUATION AND OPEN DEFENCE		17
CREDITS (PRACTICALS/SESSIONALS)			**9**	**CREDITS (PRACTICALS/SESSIONALS)**			**17**
TOTAL SEMESTER CREDITS			**17**	**TOTAL SEMESTER CREDITS**			**17**
TOTAL CUMULATIVE CREDITS			**69**	**TOTAL CUMULATIVE CREDITS**			**86**

BRANCH-ELECTRONICS AND COMMUNICATION ENGINEERING

Specialization:COMMUNICATION ENGINEERING
COMMUNICATION SYSTEMS
ELECTRONICS & COMMUNICATIONS ENGINEERING
ELECTRONICS AND TELECOMMUNICATION ENGINEERING
VLSI & EMBEDDED SYSTEMS
VLSI & EMBEDDED SYSTEMS DESIGN
VLSI DESIGN & EMBEDDED SYSTEMS
WIRELESS COMMUNICATION TECHNOLOGY
VLSI AND EMBEDDED SYSTEMS DESIGN
SIGNAL PROCESSING AND COMMUNICATION
SIGNAL PROCESSING AND ENGINEERING

First Semester							
Theory					Practical		
Course Name	**Hours/Week L/T**	**Credit Theory**	**University Marks**	**Internal Evaluation**	**Hours/ Week L/T**	**Credit Practical**	**Marks**
Computational Methods and Techniques	4-0	4	100	50	-	-	-
Internet of Things	4-0	4	100	50	-	-	-
Integrated Circuit Design	4-0	4	100	50	-	-	-
Advanced Communication Techniques	4-0	4	100	50	-	-	-
Advanced Techniques in Signal Processing	4-0	4	100	50	-	-	-
Lab-I					8	4	150
Total							
Total Marks: 900							
Total Credits: 22							

INTERNET OF THINGS (IoT)

MODULE I

Introduction to Internet of Things

Introduction-Definition & Characteristics of IoT , **Physical Design of IoT-** Things in IoT , IoT Protocols, **Logical Design of IoT-** IoT Functional Blocks, IoT Communication Models, IoT Communication APIs , **IoT Enabling Technologies-** Wireless Sensor Networks , Cloud Computing, Big Data Analytics , Communication Protocols , Embedded Systems, **IoT Levels & Deployment Templates.**

MODULE II

Domain Specific IoTs

Home Automation: Smart Lighting, Smart Appliances, Intrusion Detection, Smoke/Gas Detectors, **Cities-** Smart Parking, Smart Lighting, Smart Roads, Structural Health Monitoring, Surveillance, Emergency Response, **Environment-**Weather Monitoring, Air Pollution Monitoring, Noise Pollution Monitoring, Forest Fire Detection , River Floods Detection , **Energy-** Smart Grids , Renewable Energy Systems , Prognostics , **Retail-**Inventory Management , Smart Payments , Smart Vending Machines , **Logistics-**Route Generation & Scheduling , Fleet Tracking , Shipment Monitoring , Remote Vehicle Diagnostics, **Agriculture-**Smart Irrigation ,Green House Control ,**Industry -**Machine Diagnosis & Prognosis Indoor Air Quality Monitoring ,**Health & Lifestyle -**Health & Fitness Monitoring, Wearable Electronics **IoT and M2M Introduction, M2M-Difference between IoT and M2M, SDN and NFV for IoT-**Software Defined Networking , Network Function Virtualization

MODULE III

IoT Platforms Design Methodology

IoT Design Methodology-Purpose & Requirements Specification ,Process Specification, Domain Model Specification, Information Model Specification , Service Specifications , IoT Level Specification, Functional View Specification , Operational View Specification , Device & Component Integration , Application Development, **Case Study on IoT System for Weather Monitoring, Motivation for Using Python**

IoT Physical Devices & Endpoints

What is an IoT Device-Basic building blocks of an IoT Device, **Exemplary Device: Raspberry Pi, About the Board, Linux on Raspberry Pi , Raspberry Pi Interfaces –** Serial, SPI , I2C , **Programming Raspberry Pi with Python-**Controlling LED with Raspberry Pi , Interfacing an LED and Switch with Raspberry Pi ,Interfacing a Light Sensor (LDR) with Raspberry Pi , **Other IoT Devices-** pcDuino, Beagle Bone Black , Cubieboard

MODULE IV

IoT & Beyond : Use of Big Data and Visualization in IoT, Industry 4.0 Concepts. Overview of RFID, Low-power design (Bluetooth Low Energy), range extension techniques (data mining and mesh networking), and data-intensive IoT for continuous recognition applications. Overview of Android / IOS App Development tools & Internet Of Everything

Text Books:

Internet of Things, A Hands on Approach, by Arshdeep Bahga & Vijay audisetti, University Press.

Reference Books:

The Internet of Things, by Michael Millen, Pearson

COMPUTATIONAL METHODS AND TECHNIQUES

MODULE-I:

Neural Networks: Artificial Neural Network and Introduction, Learning Rules, Knowledge Representation and Acquisition, Different Methods of Learning.
Algorithms of Neural Network: Feed-forward Error Back Propagation, Hopfield Model, Kohonen's Featrure Map, K-Means Clustering, ART Networks, RBFN, Application of Neural Network to the relevant field.

MODULE-II:

Fuzzy Logic: Basic Concepts of Fuzzy Logic, Fuzzy vs Crisp Set, Linguistic variables, Membership Functions, Operations of Fuzzy Sets, Fuzzy If-Then Rules, Variable Inference Techniques, Defuzzification, Basic Fuzzy Inference Algorithm, Fuzzy System Design, FKBC and PID Control, Antilock Breaking System(ABS), Industrial Applications.

MODULE-III:

Optimization Fundamentals: Definition, Classification of Optimization Problems, Unconstrained and Constrained Optimization, Optimality Conditions.
LINEAR Programming: Simplex Method, Duality, Sensitivity Methods
NON-LINEAR Programming: Newton's Method, GRG Method, Penalty Function Method, Augmented Langrange Multiplier Method, Dynamic Programming and Integer Programming, Interior Point Methods, Karmakar's Algorithm, Dual Affine, Primal Affine.
MODULE-IV:

Genetic Algorithm: GA and Genetic Engineering, Finite Element based Optimization, PSO,BFO, Hybridization of Optimization Technique, Application of Optimization Technique for Solving Projects(Project solutions). Implementation of Branch Relevant Industrial Applications by Matlab Code.
Books Recommended:

1. Neural Networks- by Simon Haykin
2. Fuzzy Logic with Engineering Application- by ROSS J.T (Tata Mc)
3. Neural Networks and Fuzzy Logic – by Bart Kosko
4. An introduction Fuzzy Control – by D. Driankor, H. Hellendorn, M. Reinfrank (Narosa Pub)
5. Fuzzy Neural Control – by Junhong NIE & Derek Linkers (PHI)
6. Related IEEE/IEE Publications
7. Fuzzy System Design Principles, Building Fuzzy IF-THEN Rule Bases – by Riza C. Berikiu and Trubatch, IEEE Press
8. Ashok D. Begundu & chandrapatla T.R "Optimization concept and application in engineering", Prentice Hall,1999
9. Rao S.S "Engineering Optimization"
10. Gill, Murray and Wright ,"Practical Optimization"
11. James A. Memoh. "Electric Power System Application Of Optimization".
12. Song Y., "Modern Optimization Techniques In Power System"
13. Optimization Research; Prabhakar Pai, Oxford University Press.

INTEGRATED CIRCUIT DESIGN

Module I

The CMOS Inverters and CMOS Logic Gates – the Static View:

Introduction to CMOS Inverter, Introduction to Static CMOS Design, The Dynamic Behavior, Power, Energy, and Energy-Delay, Complementary CMOS, Pass-Transistor Logic, Transmission gates, Technology Scaling and its Impact on the Inverter Metrics

Dynamic CMOS Logic, Timing Metrics:

Dynamic CMOS Design, CMOS Logic Design Perspectives, Timing Metrics: Timing Metrics for Sequential Circuits, Classification of Memory Elements

Module-II

Basic Building Blocks:

Inverter with Active Load, Cascode, Cascode with Cascode Load, Source Follower, Threshold Independent Level Shift, Improved Output Stages

Current and Voltage Sources:

Current Mirrors, Current References, Voltage Biasing, Voltage References

CMOS Operational Amplifiers:

General Issues, Performance Characteristics, Basic Architecture, Two Stages Amplifier, Frequency Response and Compensation, Slew Rate

Module-III

Overview of Mixed-Signal Testing – Mixed-signal circuits, Test and diagnostic equipments, Mixed-signal testing challenges, The Test Specification Process – Device datasheets, Generation of test plan, Components of a test program, DC and Parametric Measurements – Continuity, Leakage currents, Power supply currents, DC references and regulators, Impedance measurements, DC offset measurements, DC gain measurements, DC power supply rejection ratio, DC common-mode rejection ratio, Comparator DC tests, Voltage search techniques, DC tests for digital circuits, Measurement Accuracy – Terminology, Calibration and checkers, Dealing with measurement errors, Basic data analysis, Tester Hardware – Mixed-signal tester overview, DC resources, Digital subsystem, AC source and measurement, Time measurement system, Computing hardware.

IDDQ Testing , Design for Testability , Built-In Self-Test , Boundary Scan , Analog Test Bus , System Test and Core Test

Module-IV

Overview of LDMOS, Power MOS, Floating Gate MOS

Emerging Technology: Overview of HEMT, FinFET, Organic FET (OFET), Graphene nano-ribbon field effect transistor (GNRFET).

IC Design for Internet of Everything (IoE): Overview of Analog IC, Digital & Memory IC, Mixed-Signal IC, RF/MM-Wave/Terahertz IC

Text books:

1. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, *Digital Integrated Circuits – A Design Perspective*, 2nd edn., Pearson Education, 2003. ISBN: 8178089912.
2. Behzad Razavi, *Design of Analog CMOS Integrated Circuits*, McGraw-Hill, 2001. ISBN: 0-07-238032-2.
3. Mark Burns and Gordon W. Roberts, *An Introduction to Mixed-Signal IC Test and Measurement*, Oxford University Press, 2001, ISBN: ISBN-10: 0195699262, ISBN-13: 9780195699265
4. Millimetre-Wave Integrator Circuits, by Eoin Carey , Sverre Lidholn, Springer Pub(Chapter-I)
5. Design of C-MOS mm-Wave & Terahertz IC with Metamaterials, by Hao Yu, Yang Shang, CRC Press.
6. Fin-FET modelling for IC Simulation nad Design, 1st edition, by Chauhan & Lu & Sriramkumar & Khandelwal & Darte & Payradosi & Nikhejad & Hu., 2015, Elsevier pub
7. HEMTs & HBTs, by Fazl Ali, Aditya KumarGupta
8. Organic Field – Effect- Transitors , by Zhenan Bao, Jasm Locklin, CRC press
9. Carbon –nano tube & Graphene Nanoribbon Interconnect, by Debiprasad Das , Hafizur Rahaman, CRC Press
10. Research papers in Specific area

Recommended Readings:

1. K. Eshraghian, and N.H.E. Weste, *Principles of CMOS VLSI Design – a Systems Perspective*, 2nd edn., Addison Wesley, 1993.
2. John P. Uyemura, *CMOS Logic Circuit Design*, Springer (Kluwer Academic Publishers), 2001.
3. Ken Martin, *Digital Integrated Circuit Design*, Oxford University Press, 2000.
4. Paul R. Gray, Paul J. Hurst, Stephen H. Lewis, and Robert G. Meyer, *Analysis and Design of Analog Integrated Circuit*, John Wiley & Sons, Inc., 4th edn., 2000. ISBN: 0-471-32168-0.
5. Phillip E. Allen and Douglas R. Holberg, *CMOS Analog Circuit Design*, Oxford University Press, 2nd edn., 2002. ISBN: 0-19-511644-5
6. Bapiraju Vinnakota, *Analog and Mixed-Signal Test*, Prentice Hall PTR, 1998, ISBN-10: 0137863101, ISBN-13: 978-0137863105

ADVANCED COMMUNICATION TECHNIQUES

MODULE-I

Digital Modulation Scheme : Representation of Digitally Modulated Signals, MSK, GMSK, Memoryless Modulation Methods; Quadrature Amplitude Modulation, Multidimensional Signaling. Signaling Schemes With Memory; Continuous-Phase Frequency-Shift Keying, Continuous-Phase Modulation. Power Spectrum of Digitally Modulated Signals; Power Spectral Density of a Digitally Modulated Signal With Memory, Power Spectral Density of Linearly Modulated Signals, Power Spectral Density of Digitally Modulated Signals With Finite Memory, Power Spectral Density of Modulated Schemes With a Markov Structure, Power Spectral Density of CPFSK and CPM Signals, Overview of AWGN Channel

Carrier and Symbol Synchronization : Signal Parameter Estimation; The Likelyhood Function, Carrier Recovery and Symbol Synchronization in Signal Demodulation. Carrier Phase Estimation; Maximum Likelyhood Carrier Phase Estimation, The Phase-Locked Loop, Effect of Additive Noise in the Phase Estimate. Symbol Timing Estimation; Maximum Likelyhood Timing Estimation.

MODULE-II

Multichannel and Multicarrier Systems: Multichannel Digital Communications in AWGN Channels; Binary Signals, M-ary Orthogonal Signals. Multicarrier Communications; Single Carrier verses Multicarrier Modulation, Capacity of a Nonideal Linear Filter Channel, OFDM, Modulation & Demodulation in an OFDM, An FFT Algorithm Implementation of an OFDM System.

Principle of multi path propagation, Impulse response model of channels, parameters for mobile multi path channels, concept of fading, Rayleigh and Ricean fading; simulation of fading channels.

Spread spectrum modulation techniques, Equalization Technique – Linear equalizer and Nonlinear equalization, algorithms for adaptive equalization, Multiple Access Techniques: Spread Spectrum Multiple Access – Frequency Hopped multiple Access (FHMA), Code Division Multiple Access (CDMA). Space Division Multiple Access (SDMA), Spectral efficiency of different access technologies, Packet ratio protocols – ALOHA, carrier sense Multiple Access (CSMA/CD, CSMA/CA), Packet reservation Multiple Access (PRMA).

MODULE-III

Error Control Coding: Linear Block Codes: Introduction, Basic definition, equivalent codes, parity - check matrix, decoding, syndrome decoding, Perfect Codes, Hamming Codes, Optimal Linear codes.

Convolution Codes : Introduction, Tree Codes and Trellis Codes, Polynomial description, The Generating function, Matrix Description, Viterbi Decoding, Distance bounds, Turbo Codes, Turbo Decoding.

Trellis Coded Modulation (TCM): Introduction, the concept of coded modulation, Mapping by set Partitioning, Design rules, TCM Decoder.

Coding for Secure Communication, Cryptography : Introduction, encryption techniques, Symmetric cryptography, data encryption standard, Asymmetric Algorithm the RSA Algorithm.

MODULE-IV

Antenna Transmission lines, Micro-strip lines, Wave guides, Microwave networks,

Microwave resonator, Electromagnetic wave Generation Process, Microwave Amplifiers and oscillators, Scattering of electromagnetic waves; Aperture antennas, active antennas, GTD/UTD techniques and its applications to horn and reflector antennas. Broadband antennas. Antenna measurements: Test ranges, near field and far field techniques.

Text Books:

1. Wireless Communications by T. S. Rappaport, 2nd Edition, Pearson Education.
2. Wireless Communications & Network 3G and beyond Itisaha Mishra, Tata Mc-Graw Hill Education Pvt. Ltd.
3. Mobile cellular Telecommunications by W. C. Y. Lee, 2nd Edition, McGraw Hill.
4. W C Y Lee; *Mobile Communication Engineering*, Tata McGraw Hill, India, 2008
5. Ranjan Bose, Information Theory, Coding and Cryptography, 2nd Edn., Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2008. ISBN-10: 0-07-066901-5, ISBN-13: 978-0-07-066901-7.
6. John G. Proakis and Masoud Salehi, *Digital Communication*, McGraw-Hill, 5th Edition
7. D.M. Pozar,Microwave Engineering, John-Wiley, 2004.

Reference Books:

1. Wireless Communication by T. L. Singal, Tata Mc-Graw Hill Education Pvt. Ltd.. Wireless Communication and Networks by V. K. Garg, Elsevier.
2. 3G Networks by SumitKasera&NishitNarang, Tata McGraw Hill. Simon Haykin, *Digital Communication*, Willy
3. Tube & Schilling, *Principle of Communication*, PHI
4. R.S. Elliott,Antenna Theory & Design, Wiley-IEEE Press, 2003.

ADVANCED TECHNIQUES IN SIGNAL PROCESSING

MODULE-I

Introduction to DSP System: Representation of DSP algorithms.

Iteration Bound: Data-flow graph representations, Loop bound and iterartion bound, Algorithms for computing iteration bound, Iteration bound of multirate data-flow graphs.

Pipelining and Parallel Processing: Pipelining of FIR digital filters, Parallel processing, Pipelining and parallel processing for low power.

Retiming: Definitions and properties, Solving systems of inequalities, Retiming techniques.

Unfolding: An algorithm for unfolding, Properties of unfolding, Critical path, unfolding and retiming, Applications of unfolding.

Folding: Folding transformation, Register minimization techniques, Register minimization in folding architectures, Folding of multirate systems.

MODULE-II

Winer Filtering: Introduction, The FIR Wiener Filter- Filtering, Linear Prediction, Noise Cancellation, IIR Wiener Filter- Noncausal IIR Wiener Filter, The Causal IIR Wiener Filter, Causal Wiener Filtering, Causal Linear Prediction, Wiener Deconvolution, Discrete Kalman Filter.

Spectrum Estimation: Introduction, Nonparametric Method- The Periodogram, Performance of Periodogram. Parametric Methods- AR Spectrum Estimation, MA Spectrum Estimation, ARMA Spectrum Estimation. Frequency Estimation- Eigendecomposition of the Autocorrelation Matrix, MUSIC.

MODULE III

Adaptive Filtering: Introduction, FIR Adaptive Filters- The Steepest Descent Adaptive Filter, The LMS Algorithm, Convergence of LMS Algorithm, NLMS, Noise Cancellation, LMS Based Adaptive Filter, Channel Equalization, Adaptive Recursive Filter, RLS- Exponentially Weighted RLS, Sliding Window RLS.

MODULE IV

Cardiovascular system: Heart structure, cardiac cycle, **ECG** (electrocardiogram) theory (B.D.), **PCG** (phonocardiogram). **EEG, X-Ray, Sonography, CT-Scan**,The nature of biomedical signals.

Analog signal processing of Biosignals: Amplifiers, Transient Protection, Interference Reduction, Movement Artifact Circuits, Active filters, Rate Measurement. Averaging and Integrator Circuits, Transient Protection circuits.

Time-frequency representations: Introduction, Short-time Fourier transform, spectrogram, wavelet signal decomposition.

Biomedical applications: Fourier, Laplace and z-transforms, autocorrelation, crosscorrelation, power spectral density.

Noise: Different sources of noise, Noise removal and signal compensation.

Text Books:

1. K. K. Parhi, *VLSI Digital Signal Processing Systems*, *Design and Implementation*, Wiley India Pvt. Ltd., New Delhi
2. R S Kandpur, *Handbook of Biomedical Instrumentation*, 2nd Edn, TMH Publication, 2003
3. E. N. Bruce, *Biomedical Signal Processing and Signal Modelling*, John Wiley, 2001.
4. Bernard Widrow and Samuel D. Stearns, *Adaptive Signal Processing*, Pearson Education.
5. Monson H. Hayes, *Statistical Digital Signal Processing & Modeling*, John Wiley & Sons
6. J.G. Proakis, D.G. Manolakis, *Digital Signal Processing*, PHI, New Delhi, 1995.

Recommended Reading:

1. Cromwell, *Biomedical Instrumentation and Measurements*, 2nd Edn, Pearson Education.
2. M. A. kay, *Time Frequency and Wavelets in Biomedical Signal Processing*, IEEE Press,1998.
3. Simon Haykin, *Adaptive Filter Theory*, 4th Edn. Pearson Education.
4. K.P. Keshab, *VLSI Digital Signal Processing Systems: Design and Implementation*, Jacaranda Wiley, 1999.
5. S.J. Orfanidis, Optimum Signal Processing, Mac Millan Publishing Co., USA, 1985.

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1ST SEMESTER				2ND SEMESTER			
CODE	**SUBJECT**	**L-T-P**	**CREDIT**	**CODE**	**SUBJECT**	**L-T-P**	**CREDIT**
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	BRANCH SPECILIZATION CORE- III	3-1-0	4		ELECTIVE- III (FROM ANY DEPATMENT)	3-1-0	4
CREDITS (THEORY)			**20**	**CREDITS (THEORY)**			**20**
PRACTICALS/SESSIONALS				**PRACTICALS/SESSIONALS**			
	LAB I	0-0-4	4		LAB II	0-0-4	4
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3RD SEMESTER				4TH SEMESTER			
CODE	**SUBJECT**	**L-T-P**	**CREDIT**	**CODE**	**SUBJECT**	**L-T-P**	**CREDIT**
	RESEARCH METHODOLOGY	3-1-0	4				
	IPR (INTELLECTUAL PROPERTY RIGHTS)	3-1-0	4				
CREDITS (THEORY)			**8**				
PRACTICALS/SESSIONALS				**PRACTICALS/SESSIONALS**			
	PRE DESSERATION WORK EVALUATION		9		DESSERATION EVALUATION AND OPEN DEFENCE		17
CREDITS (PRACTICALS/SESSIONALS)			**9**	**CREDITS (PRACTICALS/SESSIONALS)**			**17**
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INTELLECTUAL PROPERTY RIGHTS

Unit 1 - Introduction

Intellectual property: meaning, nature and significance, need for intellectual property Right (IPR), IPR in India – Genesis and development, IPR in abroad, Examples:-Biotechnology Research and Intellectual Property Rights Management.

What is a patent, What can be protected by a patent, Why should I apply for a patent? Patent Law, Patentability requirements, Non-Patentable subject matters, Layout of the Patents. Procedure for domestic and international filing of applications, Restoration, Surrender and Revocations of Patents, Rights of Patentee and Working of Patent, Licensing and Enforcing Intellectual Property.

Unit 2 – Copyrights

Copyright: meaning, scope; What is covered by copyright? How long does copyright last? Why protect copyright? Related rights, Rights covered by copyright. Ownership: Duration, Division, Transfer and Termination of Transfers.

Unit 3 – Infringement and Remedies

Literal and non-literal infringement, Role of claims, Doctrines on infringement: Equivalent doctrine, Pith and Marrow doctrine, Comparative test. Defenses: Gillette Defense, General grounds, Patents granted with conditions, Parallel import. Remedies: Civil, Administrative.

Unit 4 – State Law: Trade Secret, Contract, Misappropriation, Right of Publicity

Trademarks, Trade Secret - Overview, Requirements, Misappropriation of Trade Secret, Departing Employees, Remedies, Criminal Liability, Misappropriation, Clickwrap Agreements, Idea Submissions; Right of Publicity, Federal Preemption, Review.

Books:-

1. W. R. Cornish and D. Llewellyn, Intellectual Property: Patents, Copyrights, Trade Marks and Allied Rights, Sweet & Maxwell.
2. Lionel Bently and Brad Sherman, Intellectual Property Law, Oxford University Press.
3. P. Narayanan, Intellectual Property Law, Eastern Law House
4. B. L. Wadehra, Law Relating to Intellectual Property, Universal Law Publishing Co.
5. V. K. Ahuja, Law Relating to Intellectual Property Rights, LexisNexis.
6. Ajit Parulekar and Sarita D'Souza, Indian Patents Law – Legal & Business Implications;Macmillan India ltd, 2006
7. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010.

Reference

1. The Copyright Act, 1957
2. The Patent Act, 1970
3. The Trade Marks Act, 1999
4. The Designs Act, 2000
5. The Geographical Indication of Goods Act, 1999
6. The Protection of Plant Varieties and Farmers' Rights Act, 2001
7. The Semiconductor Integrated Circuits Layout Design Act, 2000

RESEARCH METHODOLOGY

Module I:
Introduction to RM: Meaning and significance of research. Importance of scientific research in decision making. Types of research and research process. Identification of research problem and formulation of hypothesis. Research Designs.

Module II:
Measurement and Data Collection. Primary data, Secondary data, Design of questionnaire ; Sampling fundamentals and sample designs. Measurement and Scaling Techniques, Data Processing.

Module III:
Data Analysis – I: Hypothesis testing; Z-test, t-test, F-test, Chi-square test. Analysis of variance. Non-parametric Test – Sign Test, Run test, Krushall – Wallis test

Module IV:
Data Analysis – II: Factor analysis, Multiple Regressions Analysis. Discriminant Analysis, Use of SPS Package.

Reference Books

1. Research Methodology, Chawla and Sondhi, Vikas
2. Research Methodology, Paneersevam, PHI