SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT

EVALUATION SCHEME

B.TECH.
(Information Technology)

W.E.F. SESSION 2018-19

SUBHARTI INSTITUTE OF TECHNOLOGY AND ENGINEERING
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SUBHARTI INSTITUTE OF TECHNOLOGY AND ENGINEERING
SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT
STUDY & EVALUATION SCHEME
B.Tech.4thYear/7th Semester (Information Technology)
w.e.f academic Session 2018-19

SEMESTER VII													
S. No.	Course Code	Course Name	Course Type	Periods			CCA				ESE		Total	Credit
				L	T	P	CT	AT	Total	PS	TE	PE		
1	BCSE-711 to BCSE-713	Elective-IV	PEC-4	3	0	0	20	10	30	-	70	-	100	3
2	BCSE-721 to BCSE-723	Elective-V	PEC-5	3	0	0	20	10	30	-	70	-	100	3
3	BCSE-003 to BCSE-004	Open Elective-II	OEC-2	3	0	0	20	10	30	-	70	-	100	3
4	BAS-704/BAS-304	Biology	ESC-4	2	1	0	20	10	30	-	70	-	100	3
5	BIT-751	Project-II	PROJ	0	0	12	-	-	-	100	-	200	300	6
TOTAL													700	18

SUBHARTI INSTITUTE OF TECHNOLOGY AND ENGINEERING
SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT
STUDY & EVALUATION SCHEME
B.Tech.4thYear/8th Semester (Information Technology)
w.e.f academic Session 2018-19

S. No.	Course Code	Course Name	Course Type	Periods			CCA				ESE		Total	Credit
				L	T	P	CT	AT	Total	PS	TE	PE		
1	BCSE-811 to BCSE-813	Elective-VI	PEC-6	3	0	0	20	10	30	-	70	-	100	3
2	BCSE-005 to BCSE-006	Open Elective-III	OEC-3	3	0	0	20	10	30	-	70	-	100	3
3	BCSE-007 to BCSE-008	Open Elective-IV	OEC-4	3	0	0	20	10	30	-	70	-	100	3
4	BIT-851	Project-III	PROJ	0	0	12	-	-	-	100	-	200	300	6
TOTAL													600	15

(Header spanning: SEMESTER VIII across the top of the table)

B.Tech. (Information Technology) TOTAL CREDITS – 159

BCSE-711	Data mining	3L:0T:0P	3 credits

Course Objective:
1. To introduce students to the basic concepts and techniques of Data Mining
2. To develop skills of using recent data mining software for solving practical problems.
3. To gain experience of doing independent study and research.
4. To study the methodology of engineering legacy databases for data warehousing and data mining to derive business rules for decision support systems
5. Develop and apply critical thinking, problem-solving, and decision-making skills.
6. Develop and apply enthusiasm for learning. Class participation is encouraged in this course. Enriching
7. classroom discussions and learning by communicating interest, suggestions for improvements, additional readings and Internet resources, is a major goal. Express diligence, enthusiasm, patience, and thoroughness in dealing with complicated analysis and procedures and less-than-perfect-constantly evolving technology.

Detailed contents

Unit-1
Data Warehousing: Overview, Definition, Data Warehousing Components, Building a Data Warehouse, Warehouse Database, Mapping the Data Warehouse to a Multiprocessor Architecture, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.

Unit-2
Data Warehouse Process and Technology: Warehousing Strategy, Warehouse8/management and Support Processes, Warehouse Planning and Implementation, Hardware and Operating Systems for Data Warehousing, Client/Server Computing Model & Data Warehousing. Parallel Processors & Cluster Systems, Distributed DBMS implementations, Warehousing Software, Warehouse Schema Design, Data Extraction, Cleanup & Transformation Tools, Warehouse Metadata.

Unit-3
Data Mining: Overview, Motivation, Definition & Functionalities, Data8Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data,(Binning, Clustering, Regression, Computer and Human inspection),Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, DataCompression, Numerosity Reduction, Discretization and Concept hierarchy generation, Decision Tree.

Unit -4
Classification: Definition, Data Generalization, Analytical Characterization, 8 Analysis of attribute relevance, Mining Class comparisons, Statistical measuresin large Databases, Statistical-Based Algorithms, Distance-Based Algorithms,Decision Tree-Based Algorithms.Clustering: Introduction, Similarity and Distance Measures, Hierarchical and Partitional Algorithms. Hierarchical

Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method –Statistical Approach, Association rules: Introduction, Large Itemsets, Basic Algorithms, Parallel andDistributed Algorithms, Neural Network approach.

Unit 5

Data Visualization and Overall Perspective: Aggregation, Historical 8 information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse. Warehousing applications and Recent Trends: Types of Warehousing Applications, WebMining, Spatial Mining and Temporal Mining.

OUTCOMES

- Be able to approach data mining as a process, by demonstrating competency in the use of CRISP-DM, the Cross-Industry Standard Process f or Data Mining, including the business understanding phase, the data understanding phase, the expl or at or y data analysis phase, the modeling phase, the evaluation phase, and the deployment phase.

- Be proficient with leading data mining software, including WEKA, Clementine by SPSS, and the R language.

- Understand and apply a wide range of clustering, estimation, prediction, and classification algorithms, including k-means clustering, BIRCH clustering, Kohonen clustering, classification and regression trees, the C4.5 algorithm, logistic Regression, k-nearest neighbor, multiple regression, and neural networks.

- Understand and apply the most current data mining techniques and applications, such as text mining, mining genomics data, and other current issues.

- Understand the mathematical statistics foundations of the algorithms outlined above.

Reference /Text books:

- Alex Berson, Stephen J. Smith "Data Warehousing, Data-Mining & OLAP", TMH

- Mark Humphries, Michael W. Hawkins, Michelle C. Dy, " Data Warehousing: Architecture and Implementation", Pearson

- Margaret H. Dunham, S. Sridhar,"Data Mining:Introductory and Advanced Topics" Pearson Education

- Arun K. Pujari, "Data Mining Techniques" Universities Press 5. Pieter Adriaans, Dolf Zantinge, "Data-Mining", Pearson Education

BCSE-712	ADHOC AND SENSOR NETWORK	3L:0T:0P	3 credits

COURSE OBJECTIVES:

- To develop an understanding of modern network architectures from a design and performance perspective.
- To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs), Wireless LANs (WLANs) and Wireless Sensor Networks (WSNs).
- To clarify network terminology

Detailed contents

UNIT I : INTRODUCTION

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs) :concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

UNIT II :MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols-Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

UNIT III : ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

UNIT IV: WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS

Single node architecture: hardware and software components of a sensor node – WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

UNIT V: WSN ROUTING, LOCALIZATION & QOS

Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

Course Outcomes:

- Describe the unique issues in ad-hoc/sensor networks.
- Describe current technology trends for the implementation and deployment of wireless ad-hoc/sensor networks.
- Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc/sensor networks.
- Discuss the challenges in designing routing and transport protocols for wireless Ad-hoc/sensor networks.
- Comprehend the various sensor network Platforms, tools and applications.

Reference books:

- "Ad Hoc and Sensor Networks: Theory and Applications" by Carlos de Morais Cordeiro and Dharma Prakash Agrawal
- 2. "Ad Hoc & Sensor Networks for Anna University" by Dr M A Berlin and Dr S Muthusundari
- 3. "Ad Hoc and Sensor Networks" by Agrawal
- "Advanced Technologies in Ad Hoc and Sensor Networks" by Xue Wang and Li Cui
- "Security and Privacy in Ad-hoc and Sensor Networks" by Refik Molva and Gene Tsudik
- "Security in Ad-hoc and Sensor Networks" by Claude Castelluccia and Hannes Hartenstein
- "Wireless Ad Hoc and Sensor Networks: A Cross-Layer Design Perspective (Signals and Communication Technology)" by Raja Jurdak
- "Wireless Ad hoc and Sensor Networks: Protocols, Performance, and Control (Automation and Control

BCSE-713	Web And Internet Technology	3L:0T:0P	3 credits

Objective

The aim of this course is to provide you the conceptual and technological developments in the field of Internet and web designing with the emphasis on comprehensive knowledge of Internet, its applications and the TCP/IP protocols widely deployed to provide Internet connective worldwide. The World Wide Web with its widespread usefulness has become an integral part of the Internet. Therefore, this course also puts emphasis on basic concepts of web design.

Unit-1

Introduction: Introduction and Web Development Strategies, History of Web and Internet, Protocols governing Web, Writing Web Projects, Connecting to Internet, Introduction to Internet services and tools, Introduction to client-server computing. Core Java: Introduction, Operator, Data type, Variable, Arrays, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Event handling, Introduction to AWT, AWT controls, Layout managers

Unit-2

Web Page Designing: 8 HTML: list, table, images, frames, forms, CSS, Document type definition, XML: DTD, XML schemes, Object Models, presenting and using XML, Using XML Processors: DOM and SAX, Dynamic HTML

Unit**-3**

Scripting: Java script: Introduction, documents, forms, statements, functions, objects; introduction to AJAX, Networking : Internet Addressing, InetAddress, Factory Methods, Instance Methods, TCP/IP Client Sockets, URL, URL Connection, TCP/IP Server Sockets, Datagram.

Unit-4

Enterprise Java Bean: Preparing a Class to be a JavaBeans, Creating a JavaBeans, JavaBeans Properties, Types of beans, Stateful Session bean, Stateless Session bean, Entity bean Java Database Connectivity (JDBC): Merging Data from Multiple Tables: Joining, Manipulating ,Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures.

Unit-5

Servlets: Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling HTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with Http Session Java Server Pages (JSP): Introduction, Java Server Pages Overview, A First Java Server Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries..

Outcome
- Review the current topics in Web & Internet technologies.
- Describe the basic concepts for network implementation.
- Learn the basic working scheme of the Internet and World Wide Web.
- Understand fundamental tools and technologies for web design.
- Comprehend the technologies for Hypertext Mark-up Language (HTML).
- Specify design rules in constructing web pages and sites.

- Effectively deal with programming issues relating to VB Script, JavaScript, Java, ASP, Front Page and Flash.
- Figure out the various security hazards on the Internet and need of security measures.

References:
- Burdman, Jessica, "Collaborative Web Development" Addison Wesley
- Xavier, C, " Web Technology and Design" , New Age International
- Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", BPB Publication
- Bhave, "Programming with Java", Pearson Education
- Herbert Schieldt, "The Complete Reference:Java", TMH.
- Hans Bergsten, "Java Server Pages", SPD O'Reilly
- Margaret Levine Young, "The Complete Reference Internet", TMH
- Naughton, Schildt, "The Complete Reference JAVA2", TMH
- Balagurusamy E, "Programming in JAVA", TMH

BCSE-721	NEURAL NETWORK AND DEEP LEARNING	3L:0T:0P	3 credits

Learning Objectives

- Understand the context of Neural Networks and Deep Learning
- Know how to use a neural network
- Understand the data needs of deep learning
- Have a working knowledge of MLP
- Understand the Convolutional, Recurrent, Recurrent, and Recursive models
- Work with class to word with examples of each model
- Explore the hyper parameters for each model

Course Details

Unit 1: Overview of Neural Networks and Deep Learning. Machine Learning, Neural Network Deep Learning. Introduction to Artificial Intelligence, Deep Learning (DL), Deep DL vs. AIBuilding a Neural Network and its Requirements, Tools Needed, Overview of Steps Demonstration Building a Neural Network

Unit 2 Tensor Flow: Tensor Flow and need of Tensor Flow, Computational Graph, Regression Example Tensor Board,Modularity
MLP Networks-Basics of Neural Networks, Standardization ,Regularization and Working Example,,Application Areas

Unit 3:Convolutional Neural Networks (CNN)-Understanding CNNs,Comparison to MLP,Using Multiple Filters, Working Example,Application Areas.

Recurrent Neural Networks (RNN)-Understanding RNN,Comparison to MLP,LSTM with Working Example,Application Areas

Unit 5: Recursive Neural Networks- Introduction to Recursive Neural Networks,Understanding Recursion,Understanding Recursive Neural Networks, Working Example Application Areas Using a Recursive Neural Network

Learning outcomes

- Explain different network architectures and how these are used in current applications
- implement, train, and evaluate neural networks using existing software libraries
- present and critically assess current research on neural networks and their applications

- relate the concepts and techniques introduced in the course to your own research
- plan and carry out a research project on neural networks within given time limits

Reference books:
- Neural Networks for Pattern Recognition, 1995.
- Neural Smithing: Supervised Learning in Feed forward Artificial Neural Networks, 1999.
- Deep Learning, 2016.

BCSE-722	Optimization Techniques	3L:0T:0P	3 credits

COURSE OBJECTIVES
1. To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems
2. To develop and promote research interest in applying optimization techniques in problems of Engineering and Technology
3. To apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems.

Course Details

Unit- I
Preliminaries: Inventory Models and Replacement problems: Inventory models –various costs-deterministic inventory models, Single period inventory model with shortest cost, stochastic models, Application of inventory models, Economic lot sizes-price breaks, Replacement problems-capital equipment-discounting costs-replacement in anticipation of failure- group replacement-stochastic nature underlying the failure phenomenon.

Unit - II
Linear Programming Problems (LPP): Definition of LPP, Graphical Solutions of Linear Programming Problems, Simplex Method, and Artificial Variable Method, Two Phase Method, Charnes' Big-M Method, Sensitivity Analysis, Revised Simplex Method, Duality, Dual Simplex Method

Unit- III
Integer Linear Programming Problems: Integer Linear Programming Problems, Mixed Integer Linear Programming Problems, Cutting Plane Method, Branch and Bound Method, 0-1 integer linear programming problem. Transportation Problems: Introduction to Transportation Model, Matrix Form of TP, Applications of TP Models, Basic Feasible Solution of a TP, Degeneracy in TP, Formation of Loops in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method, Techniques for Obtaining Optimal Basic Feasible Solution. Assignment Problems: Definition, Hungarian Method for AP.

Unit- IV
Introduction to NLP: Definition of NLP, Convex Programming Problems, Quadratic Programming Problems, Wolfe's Method for Quadratic Programming, Kuhn-Tucker Conditions, Geometrical Interpretation of KT-Conditions, KT-Points etc. Dynamic Programming: Bellman's Principle of optimality of Dynamic Programming, Multistage decision problem and its solution by Dynamic Programming with finite number of stages, Solution of linear programming problems as a Dynamic Programming problem

Unit- V
Queuing Theory Introduction to Queues, Basic Elements of Queuing Models, Queue Disciplines, Memory less Distribution, Role of Exponential and Poisson Distributions, Markovian Process, Erlang Distribution, Symbols and Notations, Distribution Of Arrivals, Distribution of Service Times, Definition of Steady and Transient State, Poisson Queues.

Course Outcome:
1. Describe clearly a problem, identify its parts and analyze the individual functions.
2. Feasibility study for solving an optimization problem
3. Becoming a mathematical translation of the verbal formulation of an optimization problem.

4. To design algorithms, the repetitive use of which will lead reliably to finding an approximate solution
5. Evaluate and measure the performance of an algorithm.
6. Discovery, study and solve optimization problems.
7. Understand optimization techniques using algorithms.
8. Investigate, study, develop, organize and promote innovative solutions for various applications.

References:

1. Hadley, G.,"Linear Programming, and Massachusetts", Addison-Wesley . 2. Taha, H.A, "Operations Research – An Introduction", Macmillian 3. Hiller, F.S., G.J. Lieberman, " Introduction to Operations Research", Holden-Day. 4. Harvey M. Wagner, "Principles of Operations R esearch with Applications to Managerial Decisions", Prentice Hall of India Pvt. Ltd. 5. Swarup K , "Operation Research", S. Chand New Delhi.

BCSE-723	INFORMATION THEORY AND CODING	3L:0T:0P	3 credits

Course Objectives:
The participants will learn the basic concepts of information theory and coding, including information, source coding, channel model, channel capacity, channel coding and so on. The main purpose of this course is to help students to complete the understanding of the wireless communication system with other advanced courses in wireless communication.

Detail Course

Unit- I
Review of probability theory, Definition of Information Measure and Entropy: Measure of information, Average information content of symbols in long independent sequences, Average information content of symbols in long dependent sequences. Mark-off statistical model for information source, Entropy and information rate of mark- off source, Mutual information. Asymptotic Properties of Entropy and Problem Solving in Entropy

Unit – II
Block Code and its Properties, Data compression, Kraft-Mcmillan Equality and Compact Codes, Encoding of the source output, Shannon's encoding algorithm, Coding Strategies, Huffman Coding, Shannon-Fano-Elias Coding and Introduction to Arithmetic Coding.

Unit – III
Introduction to Information Channels, Communication Channels, Discrete communication channels, Continuous channels. Discrete memory less Channels, Mutual information, Channel Capacity, Channel coding theorem, Differential entropy and mutual information for continuous ensembles, Channel capacity Theorem.

Unit – IV
Introduction to Error Control Coding: Introduction, Types of errors, examples, Types of codes Linear Block Codes: Matrix description, Error detection and correction, Standard arrays and table look up for decoding

Unit – V
Binary Cycle Codes, Algebraic structures of cyclic codes, Encoding using an (n-k) bit shift register, Syndrome calculation. BCH codes. RS codes, Golay codes, Shortened cyclic codes, Burst error correcting codes. Burst and Random Error correcting codes. Convolution Codes, Time domain approach. Transform domain approach.

Course Outcome:
After completion of the course, the student is able to
1: Design the channel performance using Information theory.
2: Comprehend various error control code properties
3: Apply linear block codes for error detection and correction
4: Apply convolution codes for performance analysis & cyclic codes for error detection and correction.
5: Design BCH & RS codes for Channel performance improvement against burst errors.

Reference:
1.K. Sam Shanmugam, "Digital and analog communication systems", John Wiley.
2.Simon Haykin, "Digital communication", John Wiley.
3.Ranjan Bose, "ITC and Cryptography" ,Tata McGraw-Hill.
4. Thomas M. Cover, Joy A. Thomas ," Elements of Information Theory, 2nd Edition", Wiley Publication.

BCSE-003	CYBER LAW AND ETHICS	3L:0T:0P	3 credits

Objective

- Safeguard national critical information infrastructure (CII)
- Respond to, resolve, and recover from cyber incidents and attacks through timely information sharing, collaboration, and action
- Establish a legal and regulatory framework to enable a safe and vibrant cyberspace
- Foster a culture of cyber security that promotes safe and appropriate use of cyberspace
- Develop and cultivate national cyber security capabilities
- Collectively, these objectives provide the foundation for protecting against and preparing for cyber threats (i.e., a proactive approach to cyber security) as well as detecting, responding to, and recovering from threats and challenges (i.e., reactive cyber security efforts)

Course Details

Unit I: Introduction -Overview of Computer and Web Technology ,Need for Cyber Law ,Cyber Jurisprudence at International and Indian Level

Unit II: Jurisdictional Aspects in Cyber Law ,Issues of jurisdiction in cyberspace ,Types of jurisdiction ,The Test evolved -Minimum Contacts Theory -Sliding Scale Theory -Effects Test and International targeting , Jurisdiction under IT Act, 2000.

Unit III: Cyber Crimes& Legal Framework ,Cyber Crimes against Individuals, Institution and State , Hacking , Digital Forgery ,Cyber Stalking/Harassment ,Cyber Pornography ,Identity Theft & Fraud , Cyber Terrorism , Cyber Defamation Right to Privacy and Data Protection on Internet -Concept of privacy -Threat to privacy on internet -Self-regulation approach to privacy -Ingredients to decide confidentiality of information -Breach of sensitive personal information and confidentiality under IT Act and penalties for the same. -Right of Interception under IT Act. Different offences under IT Act, 2000

Unit IV: Digital signature and Electronic Signature and Data Protection-Concept of public key and private key -Certification authorities and their role -Creation and authentication of digital signature -Concept of electronic signature certificates

Electronic Governance -Concept of electronic records and electronic signatures -Rules for attribution, acknowledgement and dispatch of such records.

Unit V: E Contracting ,Salient features of E-contract ,Formation of E-contract and types ,E-mail Contracting , Indian Approach on E-contracts

Unit VI: E Commerce -E-commerce-Salient Features and advantages ,Models of E-commerce like B2B, B2C , Indian Laws on E-commerce Unit VII: Intellectual Property Issues in Cyber Space ,Interface with Copyright Law ,Interface with Patent Law Trademarks &Domain Names Related issues ,Dispute Resolution in Cyberspace

Course OUTCOMES

- Students identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.

- Students locate and apply case law and common law to current legal dilemmas in the technology field.
- Students apply diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.
- Students distinguish enforceable contracts from non-enforceable contracts. 5. Students demonstrate leadership and teamwork.

References
•Karnika Seth, Computers, Internet and New Technology Laws, Lexis NexisButterworthsWadhwa Nagpur.
•Chris Reed & John Angel, Computer Law, OUP, New York, (2007).
•Justice Yatindra Singh,Cyber Laws, Universal Law Publishing Co, New Delhi, (2012).
•Verma S, K, Mittal Raman,Legal Dimensions of Cyber Space, Indian Law Institute, New Delhi, (2004) •JonthanRosenoer, Cyber Law, Springer, New York, (1997)
. •SudhirNaib, The Information Technology Act, 2005: A Handbook, OUP, New York, (2011)
•S. R. Bhansali, Information Technology Act, 2000, University Book House Pvt. Ltd., Jaipur (2003).
•Vasu Deva, Cyber Crimes and Law Enforcement, Commonwealth Publishers, New Delhi, (2003).

| BCSE-004 | HISTORY OF SCIENCE | 3L:0T:0P | 3 credits |

Objectives

- Explore the roots of the Scientific Revolution. Determine whether there was one revolution or revolutions.
- Evaluate the scientific method throughout history, and explain the differences between scientific hypotheses and laws.
- Compare and contrast the modern scientific method with science as practiced by early humans, through the early Greeks, Romans, Medieval, Early Modern, and Modern eras. Explain the distinction between scientist and natural philosopher. Evaluate whether this distinction has evolved over time.
- Describe the differences between basic and applied science. Explain how the two types of science are interconnected.
- Evaluate the influence of religion and politics on scientific discoveries and research throughout the ages. Examine whether science has existed in a vacuum without the support and restrictions provided by institutions.

Course details

Unit-I. Science and Technology-The Beginning1.Development in different branches of Science in Ancient India: Astronomy, Mathematics, Engineering and Medicine.03-282.Developments in metallurgy: Use of Copper, Bronze and Iron in Ancient India.
Development of Geography: Geography in Ancient Indian Literature.

Unit-II Developments in Science and Technology in Medieval India1.Scientific and Technological Developments in Medieval India; Influence of the Islamic world and Europe; The role of maktabs, madrasas and karkhanas set up..Developments in the fields of Mathematics, Chemistry, Astronomy and Medicine.Innovations in the field of agriculture -new crops introduced new techniques of irrigation etc.

Unit-III. Developments in Science and Technology in Colonial India1.Early European Scientists in Colonial India-Surveyors, Botanists, Doctors, under the Company's Service. ndian Response to new Scientific Knowledge, Science and Technology in Modern India.

Development of research organizations like CSIR and DRDO; Establishment of Atomic Energy Commission; Launching of the space satellites.

Unit-IV. Prominent scientist of India since beginning and their achievement1.Mathematics and Astronomy: Baudhayan, Aryabhtatta, Brahmgupta, Bhaskaracharya, Varahamihira, Nagarjuna. Medical Science of Ancient India (Ayurveda & Yoga): Susruta, Charak, Yoga & Patanjali. Scientists of Modern India: Srinivas Ramanujan, C.V. Raman, Jagdish Chandra Bose, Homi Jehangir Bhabha and Dr. Vikram Sarabhai.

BAS-704/BAS-304	BIOLOGY	2L:1T:0P	3 credits

Objectives:

- To show how natural selection ultimately underpins all biological processes and how evolution has generated biological diversity.
- To outline the major transitions in evolution, from the origin of life and of sex, to hominid evolution.
- To investigate the evolutionary basis of behaviour in animals, including primates and man.
- To develop your practical biological skills.

COURSE DETAILS

Unit 1.
Nature of light, spectrum of light useful for various biological processes in the life of plants and animals, spectrum of light which is harmful to life, unit of light energy (Photon, quantum), Photo Biological reactions. Measurement of light (Lux, Foot Candle). Pigments associated with harvesting light energy: pigments/receptors of light, chlorophylls, caroteniods, phycobilinoproteins, bacteriochlorophylls, phytochromes, Rhodopsin etc. chemistry and functional roles.

UNIT 2
Photosynthesis: History, Photosynthetic equations, Light and dark reactions, mechanism of photolysis of water and oxygen evolution; C3, C4, CAM plants, spectrum of photo autotrophs, photo autotroph vs photo heterotrophs; Photoautotroph vs. chemoautotroph, structure of chloroplast and quanta some, An oxygenic and oxygenic photosynthesis, reaction centers.
15 Periods

UNIT 3
Bioluminescence: definition, discovery, examples of organisms, photoreceptors – distribution, mechanism; Phytochrome mediated photomorphogenesis phenomena – seed germination etc.. Photoperiodism: LDP, SDP, DNP plants, vernalization, vernalin, etiolation and de-etiolation. Light as an ecological factor affecting distribution of plants and animals (Phyto and Zoo geography), in terrestrial and aquatic ecosystems: Morphological, Anatomical, Physiological and Behavioural adaptations to extreme light conditions by organisms. 15 Periods

UNIT 4
Behavioural aspects: circadian rhythms, jetlag, rhythm of heart beat and other examples. Light as an inducer for biosynthesis of enzymes, hormones and other biomolecules. 8 Periods
Suggested Reading Materials:

OUTCOMES:
- To provide students with a broad conceptual background in the biological sciences.
- To provide students with technical and analytical skills used in modern biological research:
- To provide students with an understanding of the role of science in society and the ethical conduct of science.
- To provide students with the ability to develop hypotheses and design approaches to evaluate them, as well as to access and critically evaluate information in biology:

- To provide students with the ability to effectively communicate the findings of biological research and incorporate these findings into the existing body of knowledge in biology:

References:
- Hawes C & Satiat-Jeunemaitre – 2001 Plant Cell Biology : Practical approach
- Buchanan B, Gruissem G & Jones R – 2000 – Biochemistry and Molecular Biology of Plants.
- Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd

| BCSE-811 | INTERNET OF THINGS | 3L:0T:0P | 3 credits |

Course Objectives
1. To assess the vision and introduction of IoT.
2. To Understand IoT Market perspective.
3. To Implement Data and Knowledge Management and use of Devices in IoT Technology.
4. To Understand State of the Art - IoT Architecture.
5. To classify Real World IoT Design Constraints, Industrial Automation in IoT.

COURSE DETAIL
Unit-1
IoT Web Technology :The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics
Unit-2
IoT Applications for Value Creation: Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT for Oil and Gas Industry, Opinions on IoTApplication and Value for Industry, Home Management, eHealth.
Unit-3
Internet of Things Privacy, Security and Governance: Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smarty Approach. Data Aggregation for the IoT in Smart Cities, Security
Unit-4
Architectural Approach for IoT Empowerment : Introduction, Defining a Common Architectural Ground, IoT Standardization,M2M Service Layer Standardization, OGC Sensor Web for IoT, IEEE, IETF and ITU-T Standardization activities, Interoperability Challenges, Physical vs. Virtual, Solve the Basic First, Data Interoperability, Semantic Interoperability, Organizational Interoperability, Eternal Interoperability, Importance of Standardization, Plan for Validation and testing, Important Economic Dimension, Research Roadmap for IoT Testing Methodologies. Semantic as an Interoperability Enabler and related work.
Unit-5
Identity Management Models in IoT: Introduction, Vulnerabilities of IoT, Security requirements, Challenges for a secure Internet of Things, identity management, Identity portrayal, Different identity Management model: Local identity, Network identity, Federated identity, Global web identity, Identity management in Internet of Things, User-centric identity management, Device-centric identity management, Hybrid identity management.
Course Outcome:
1: Interpret the vision of IoT from a global context.
2: Determine the Market perspective of IoT.
3: Compare and Contrast the use of Devices, Gateways and Data Management in IoT.

4: Implement state of the art architecture in IoT.
5: Illustrate the application of IoT in Industrial Automation and identify Real World Design Constraints.

REFRENCES:
 1. Olivier Hersent,DavidBoswarthick, Omar Elloumi"The Internet of Things key applications and protocols",Wiley
2. Michael Miller "The Internet of Things" Pearson
3. Adrian McEwen,HakinCassimally"Designing the Internet of Things" Wiley India

BCSE-812	Cryptography & Network Security	3L:0P:0T	3 Credits

Course Objectives:
- To understand the fundamentals of Cryptography
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand the various key distribution and management schemes.
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To design security applications in the field of Information technology

DETAIL COURSE

UNIT-I
Introduction to security attacks, services and mechanism, Classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard(DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES

UNIT -II
Introduction to group, field, finite field of the form GF(p), modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, Discrete Logarithmic Problem, Principals of public key crypto systems, RSA algorithm, security of RSA

UNIT -III
Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA) Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS), proof of digital signature algorithm,

UNIT -IV
Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Authentication Applications: Kerberos Electronic mail security: pretty good privacy (PGP), S/MIME.

UNIT -V
IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Introduction to Secure Socket Layer, Secure electronic, transaction (SET). System Security: Introductory idea of Intrusion, Intrusion detection, Viruses and related threats, firewalls

References:
1. William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education.
2. Behrouz A. Frouzan: Cryptography and Network Security, TMH
3. Bruce Schiener, "Applied Cryptography". John Wiley & Sons

4. Bernard Menezes," Network Security and Cryptography", Cengage Learning.
 5. Atul Kahate, "Cryptography and Network Security", TMH

Course Outcomes:

- Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
- Identify the security issues in the network and resolve it.
- Evaluate security mechanisms using rigorous approaches, including theoretical
- Compare and Contrast different IEEE standards and electronic mail security

BCSE-813	Real Time Systems	3L:0P:0T	3 Credits

Course Objective:
- Introduction of the real-time systems.
- Computing required for the real-time embedded systems.
- Communication required for the real-time embedded systems.

DETAIL COURSE
UNIT-I:
Introduction Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc., Release Times, Deadlines, and Timing Constraints, Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency.

UNIT-II:
Real Time Scheduling Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems.

UNIT-III:
Resources Access Control Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority-Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Unit Resources, Controlling Concurrent Accesses to Data Objects.

UNIT-IV:
Multiprocessor System Environment Multiprocessor and Distributed System Model, Multiprocessor Priority-Ceiling Protocol, Schedulability of Fixed-Priority End-to-End Periodic Tasks, Scheduling Algorithms for End-to-End Periodic Tasks, End-to-End Tasks in Heterogeneous Systems, Predictability and Validation of Dynamic Multiprocessor Systems, Scheduling of Tasks with Temporal Distance Constraints.

UNIT-V:
Real Time Communication Model of Real Time Communication, Priority-Based Service and Weighted Round-Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols, Real Time Protocols, Communication in Multicomputer System, An Overview of Real Time Operating Systems.

Course Outcome:
- To present the mathematical model of the system.
- To develop real-time algorithm for task scheduling.
- To understand the working of real-time operating systems and real-time database.
- To work on design and development of protocols related to real-time communication

References:

- Real Time Systems by Jane W. S. Liu, Pearson Education Publication.
- Real-Time Systems: Scheduling, Analysis, and Verification by Prof. Albert M. K.

| BCSE-005 | Comparative Study | 3L:0P:0T | 3 Credits |

Objectives

- Understand the conceptual and theoretical tools necessary to for comparative studies as well as the variety of types and themes of regional cooperation;
- Engage critically with the literature and the news reporting on different AREA across the world;
- Understand how economic and material interests interact with ideational and identity factors .

COURSE DETAILS:

UNIT1: Introduction and conceptual tools : Introduction Conceptualising comparative political studies, Analysing and comparing political regimes,The state and varieties of democracy and autocracy Transition, consolidation and breakdown of political regimes

UNIT2: Conceptualising regional studies: Why and how do states cooperate on a regional level? Sovereignty, Inter governmentalism and supranationalism ,Types of regional institutions and themes of regional cooperation

UNIT3: Regional and interregional orders, institutions and challenges , Europe EU enlargement, Reading week, no classes ,Mid-term exams, no classes .

UNIT4: North America and the transatlantic region The crises of Western democracies, Eurasia Reverse waves in the post-Soviet space ,Africa The state of the state in sub-Saharan Africa

 UNIT 5 Middle East and North Africa Revolution and counterrevolution in the Arab world Spring recess

Required Books:

- Börzel, T. and Risse, T. (eds) (2016) The Oxford Handbook of Comparative Regionalism. Oxford: Oxford University Press.
- Boix, C. and Stokes, S. C. (eds) (2009) The Oxford Handbook of Comparative Politics. Oxford: Oxford University Press.
- Siaroff, A. (2013) Comparing Political regimes: A Thematic Introduction to Comparative Politics. Toronto: University of Toronto Press.
- Landman, T. (2003) Issues and Methods in Comparative Politics. London: Routledge.

BCSE-006	INDIAN MUSIC SYSTEM	3L:0P:0T	3 Credits

OBJECTIVES

- To create a strong research oriented theoretical / practical foundation in consonance with recent advances in the discipline of Music.
- To enable students to take a creative and analytical approach to the programme that combines conceptual repertoire, research practices and excellences in performance whilst keeping in view the traditional values and modern trends o f this discipline.
- To provide an opportunity to extend the knowledge based on practical and theoretical advancements so to have a healthy interaction at the International level.

COURSE DETAIL

UNIT1- **Introduction** to Shruti:Shruti in Indian Classical Music,Pitch and Intonation,How to find your pitch,Singing Sa Pa Sa: Sing Sa Pa Sa in different pitches,Connecting the notes, Octaves or Sthayis:Madhyama Sthayi, Mandra Sthayi, Taar Sthyai,Sur Sadhana
Singing in Different Pitches:Singing in Different Pitches,Sing a Song in Different Pitches

UNIT2-**Vedic Music**: Sama and stobhaksharas, the notes of Vedic music, Gramgeya gana, Aranyageya gana, Poorvarchicka, Uttararchicka, Udatta, Anudatta, Swarita, Vedic and Loukik scales, Panchvidha & Saptavidha sama, Vedic instruments

UNIT3-Musical references in Ramayana, Mahabharata and Puranas (Harivansh & Vayu Puranas)

UNIT4-Works of the following: Ahobal, Ramamatya, Somnath, Lochan, Bhavbhatt, Vyankatmakhi, Notation of compositions in prescribed ragas.

 UNIT5-Theoretical knowledge of prescribed ragas.

OUTCOMES

- Better knowledge of Indian music, pitch/shruthi, Tanpura, drone
- Ability to identify Sa Pa Sa for a given reference pitch
- Ability to sing the seven musical notes with pitch reference
- Maintain Shruthi throughout a song while performing
- Preparedness to sing a song in a given pitch
- Readiness to take on more courses in any Indian musical genre
  Refrence Books
- E. Clements - Study of Indian Music
- Ra. Avtar 'Vir' - Theory of Indian Music
- Swami Prajnananda : Historical Development of Indian Music
- S.S.Paranjape: Bharatiya Sangeet Ka Itihasa
- Thakur Jaidev Singh: Bharatiya Sangeet Ka Itihasa

BCSE-007	INTRODUCTION TO ART AND AESTHETICS	3L:0P:0T	3 Credits

OBJECTIVE

- The main objective of the subject is to impart the knowledge about complete and theoretical studies of Aesthetics.

Detail Course

Unit 1. Defining Aesthetics(5%): What is Aesthetics,Aesthetic Experience, Plato , Aristotle.
Unit 2. History of Indian Aesthetics (20%): Five Schools, Bharatmuni, Natyashashtra,
Unit 3. Nine types of Rasa (20%): The principle study of Rasa like: Love, Joy, Wonder, Peace, Anger, courage, Fear, Sadness, Disgust.
Unit 4.Six types of Bhavas (20%): The principle study of Bhavas like: Unruffled feeling, Comrade feeling, Servent-Master attitude, Mother Child feeling, Loved-Beloved feeling, Oneness with God.
Unit 5.Applied Media Aesthetics (20%): What is Applied Media Aesthetics, Fundamental Elements of Applied Media Aesthetics, difference between Applied Media Aesthetics and Traditional Aesthetics.

Outcomes:

Students will be able to demonstrate the centrality of aesthetic experience in human life, to appreciate its different forms and functions, to get acquainted with the most fundamental aesthetic concepts and ideas, to recognize the need and the complexity of aesthetic reasoning, to learn how to understand major theoretical articulations of aesthetics.

References:

1.Indigenous Aesthetics: Native Art, Media, and Identity by Steven Leuthold (University of Texas Press),Publisher- University of Texas Press.

2.Art Beauty and Creativity: Indian and Western Aesthetics by Shyamala Gupta ,PublisherD K Print World.

BCSE-008	ECONOMIC POLICIES IN INDIA	3L:0P:0T	3 Credits

OBJECTIVES

The objective of this paper is to introduce the basic concepts of economics to the students so as to enable them for further learning in economics.

COURSE DETAILS

UNIT 1-Framework of Indian Economy -National Income: Trends and Structure of National Income ,Demographic Features and Indicators of Economic Growth and Development Rural-Urban Migration and issues related to Urbanization ,Poverty debate and Inequality, Nature, Policy and Implications , Unemployment-Nature, Central and State Government's policies, policy implications, Employment trends in Organized and Unorganized Sector

UNIT2- Development Strategies in India - Agricultural- Pricing, Marketing and Financing of Primary Sector , Economic Reforms- Rationale of Economic Reforms, Liberalization, Privatization and Globalization of the Economy, Changing structure of India's Foreign Trade , Role of Public Sector- Redefining the role of Public Sector, Government Policy towards Public Sector, problems associated with Privatization, issues regarding Deregulation-Disinvestment and future of Economic Reforms

UNIT3.-The Economic Policy and Infrastructure Development - Energy and Transport ,Social Infrastructure- Education, Health and Gender related issues, Social Inclusion , Issues and policies in Financing Infrastructure Development , Indian Financial System- issues of Financial Inclusion, Financial Sector Reforms-review of Monetary Policy of R.B.I. Capital Market in India.

UNIT4. The Economic Policy and Industrial Sector -Industrial Sector in Pre-reforms period, Growth and Pattern of Industrialization ,Industrial Sector in Post-reform period- growth and pattern of Micro, Small, Medium Enterprises s, problems of India's Industrial Exports , Labour Market- issues in Labour Market Reforms and approaches to Employment Generation

Learning Outcome:

After studying this paper the student will be able to understand the basic concepts of economics and equip oneself to understand the subject in greater detail, later semesters.

REFRENCE BOOKS:

• Brahmananda, P.R. and V.A. Panchmukhi.[2001], Ed. 'Development Experience in Indian Economy, Inter-state Perspective,' Bookwell, New Delhi.

• Gupta,S.P.[1989],'Planning and Development in India: A Critique,' Allied Publishers Private Limited, New Delhi.

• Bhagwati, Jagdish.[2004],'In Defense of Globalization,' Oxford University Press, U.K.

• Dhingra, Ishwar //C.[2006],'Indian Economy,' Sultan Chand and Sons, New Delhi.

• Datt, Ruddar and Sundaram, K.P.M.[Latest edition] ,'Indian Economy,' S. Chand and Co, New Delhi.