E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai Accredited by NAAC with 'A' Grade | Accredited by NBA

NAGAPATTINAM – 611002

M.E. COMMUNICATION SYSTEMS

REGULATION -2021

First Year – Second Semester

Course Category	Course Code	Course Name	L	T	P	C	Maximum Marks		
							CA	ES	Total
Theory Course									
PCC	2102CO201	Wireless Communication Engineering	3	0	0	3	40	60	100
PCC	2102CO202	Optical Switching and Networking	3	0	0	3	40	60	100
PCC	2102CO203	High Speed Communication Networks	3	0	0	3	40	60	100
PEC	2103CO015	Program Elective – III(Radiating Systems)	3	0	0	3	40	60	100
PEC	2103CO019	Program Elective – IV(Optical Signal Processing)	3	0	0	3	40	60	100
AC		Audit Course – II	2	0	0	0	100	00	100
Laboratory Course									
PCC	2102CO204	Wireless Communication Networks Laboratory	0	0	4	2	50	50	100
EEC	2104CO205	Mini Project with Seminar	0	0	4	2	50	50	100
Total			**17**	**0**	**8**	**19**	**400**	**400**	**800**

PCC		WIRELESS COMMUNICATION ENGINEERING	L	T	P	C
2102CO201			3	0	0	3

Course Objectives:

1. To learn the concepts of wireless communication.
2. To know about the various propagation methods, Channel models, capacity calculations multiple antennas and multiple user techniques used in the mobile communication

MODULE I	**WIRELESS CHANNEL PROPAGATION AND MODEL**	**9 Hours**

Propagation of EM signals in wireless channel – Reflection, diffraction and Scattering-free space, two ray. Small scale fading-channel classification- channel models – COST -231 Hata model, Longley-Rice Model, NLOS Multipath Fading Models: Rayleigh, Rician, Nakagami, Composite Fading –shadowing Distributions, Link power budget Analysis.

MODULE II	**CAPACITY OF WIRELESS CHANNELS**	**9 Hours**

Capacity in AWGN, capacity of flat fading channel, capacity of frequency selective fading channels.

MODULE III	**DIVERSITY**	**9 Hours**

Realization of independent fading paths, Receiver Diversity: selection combining, Threshold Combining, Maximum-ratio Combining, Equal gain Combining. Transmitter Diversity: Channel known at transmitter, channel unknown at the transmitter

MODULE IV	**MIMO COMMUNICATIONS**	**9 Hours**

Narrowband MIMO model, Parallel decomposition of the MIMO channel, MIMO channel capacity, MIMO Diversity Gain: Beam forming, Diversity-Multiplexing trade-offs, Space time Modulation and coding : STBC,STTC, Spatial Multiplexing and BLAST Architectures.

MODULE V	**MULTI USER SYSTEMS**	**9 Hours**

Review of Multiple Access Techniques, Scheduling, power control, Uplink and Downlink channel capacity, multiuser diversity, MIMO-MU systems.

Total:	**45 Hours**

Further Reading:

Non-regenerative MIMO wireless relays, Finite state Markov model of correlated Rician-fading channels, Fractionally Spaced Equalizer Pass band Equalization - Optimum Digital Detector in Additive Gaussian Noise Detection of binary data using spectrum estimation techniques.

Course Outcomes:

After completion of the course, Student will be able to

1. Analyze the state of art techniques in wireless communication.
2. Describe MIMO Communications
3. Review multiple access techniques

References:

1. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2007.
2. Harry R. Anderson, - Fixed Broadband Wireless System Design‖ John Wiley - India, 2003. Education 2009.
3. Andreas.F. Molisch, - Wireless Communications‖, John Wiley - India, 2006.
4. Simon Haykin& Michael Moher, - Modern Wireless Communications‖, Pearson Education, 2007.
5. Rappaport. T.S., - Wireless communications‖, Pearson Education, 2003.
6. Gordon L. Stuber, - Principles of Mobile Communication‖, Springer International Ltd., 2001.
7. UpenaDalal, ―Wireless Communication ― Oxford Higher

PCC		OPTICAL SWITCHING AND NETWORKING	L	T	P	C
2102CO202			3	0	0	3

Course Objectives:

1.To enable the student to understand the importance of optical switches and network architecture and connections

2.To enable the student to understand the differences in routing, switching and the resource allocation methods and the network management and protection methods

3.To expose the student to the advances in networking and switching domains and recent trends in optical network

MODULE I	OPTICAL SWITCHES	9 Hours

Introduction to Optical Switches, Electro-Optical switches, Thermo-optical switches, Magneto-optical switches, MEMs based optical switches, SOA based optical switches, Liquid crystal optical switches, Photonic crystal all-optical switches and its application

MODULE II	OPTICAL NETWORK ARCHITECTURES AND CONNECTIONS	9 Hours

Introduction to Optical Networks, Need for Multi-layered Architecture, Layers and Sub-layers, Spectrum partitioning, Optical Net-work Nodes, Network Access Stations, Overlay Processor, Logical network overlays, Generalized Multiprotocol Label Switching, Connection Management and Control, Static Networks, Wavelength Routed Networks, Linear Light wave networks, Logically Routed Networks, Routing and Wavelength Assignment , Traffic Grooming in Optical Networks.

MODULE III	OPTICAL NETWORK SURVIVABILITY	9 Hours

Protection and Restoration Objectives, Fault Protection and Restoration Techniques in the Logical Layer - Point-to-Point Systems, Protection in SONET/SDH and client layer, Self-Healing Rings, Interconnection Techniques, Architectures with Arbitrary Mesh Topologies, Optical-Layer Protection: Point – to - Point and Ring Architectures, Mesh Architectures, Survivability Techniques for Multicast Connections

MODULE IV	OPTICAL PACKET SWITCHING NETWORKS	9 Hours

Optical Packet-Switching Network Architectures, Contention Resolution, OPS Enabling Technologies, Optical Burst Switching, Contention Resolution in OBS Networks, Optical Label Switching, All-Optical Label Swapping, Contention Resolution in OLS

MODULE V	NETWORK PERFORMANCE AND RECENT TRENDS	9 Hours

Performance Impairments in an Optical Network Environment, The Passive Optical Networks, Metropolitan Area Networks, Long - Haul and Ultra Long - Haul Networks, Introduction to Software Defined Networking, Reconfigurable Optical Add/Drop Multiplexer (ROADM).

	Total:	45 Hours

Further Reading:

Plastic optical fiber, Fiber optic Connectors, Li-Fi technology, Test equipments-Fault locators, fiber identifiers

Course Outcomes:

After completion of the course, Student will be able to

1.Use the backbone infrastructure for our present and recent communication needs

2.Compare the differences in routing, switching, resource allocation methods, network management and protection methods

3.Describe the advances and recent trends in the networking and switching approaches

References:

1. Thomas E. Stern, Georgios Ellinas, Krishna Bala, Multiwavelength Optical Networks – Architecture, Design and control, Cambridge University Press, 2nd Edition, 2009
2. Rajiv Ramaswami and Kumar N. Sivarajan, Optical Networks: A Practical Perspective, Harcourt Asia Pte Ltd., Second Edition 2006
3. C. Siva Ram Moorthy and Mohan Gurusamy, WDM Optical Networks : Concept, Design and Algorithms‖, Prentice Hall of India, Ist Edition, 2002
4. P.E. Green, Jr., Fiber Optic Networks‖, Prentice Hall, NJ, 1993
5. Biswanath Mukherjee, Optical WDM Networks‖, Springer, 2006
6. S J Chua B Li - Optical Switches, Wood head Publishing,2010

PCC		HIGH SPEED COMMUNICATION NETWORKS	L	T	P	C
2102CO203			3	0	0	3

Course Objectives:

1. To develop a comprehensive under standing of multimedia networking.
2. To study the types of VPN and tunneling protocols for security.
3. To learn about network security in many layers and network management.

MODULE I	**INTRODUCTION**	**9 Hours**

Review of OSI,TCP/IP; Multiplexing, Modes of Communication, Switching, Routing .SONET– DWDM–DSL–ISDN–BISDN,ATM.

MODULE II	**MULTIMEDIA NETWORKING APPLICATIONS**	**9 Hours**

Streaming stored Audio and Video–Best effort service–protocols for real time interactive applications–Beyond best effort–scheduling and policing mechanism –integrated services– RSVP-differentiated services.

MODULE III	**ADVANCED NETWORKS CONCEPTS**	**9 Hours**

VPN-Remote-Access VPN, site-to-site VPN, Tunneling to PPP, Security in VPN. MPLS-operation, Routing, Tunneling and use of FEC, Traffic Engineering, MPLS based VPN, overlay networks-P2P connections.

MODULE IV	**TRAFFIC MODELLING**	**9 Hours**

Little's theorem, Need for modeling, Poisson modeling and its failure, Non-poisson models, Network performance evaluation.

MODULE V	**NETWORK SECURITYAND MANAGEMENT**	**9 Hours**

Principles of cryptography –Authentication–integrity–key distribution and certification–Access control and: firewalls–attacks and counter measures–security in many layers. Infrastructure for network management – The internet standard management framework – SMI, MIB, SNMP, Security and administration–ASN.1

Total:	**45 Hours**

Further Reading:

IP Switching ,Ipv6,Ipv6 over ATM

Course Outcomes:

After completion of the course, Student will be able to

1. know basics of Networks
2. Understand applications of multimedia networking
3. Examine advanced networking techniques
4. illustrate Traffic modelling concepts
5. know security basics and its management

References:

1. J.F. Kurose &K.W. Ross," Computer Networking- A top down approach featuring the internet", Pearson 2nd edition, 2003.
2. Walrand.J. Varatya, High performance communication network, Morgan Kauffman– Harcourt Asia Pvt.Ltd.2nd Edition,2000.3.
3. LEOM – Gar CIA, WIDJAJA, "Communication networks", TMH seventh reprint2002.
4. Aunurag kumar, D. MAnjunath, Joykuri, "Communication Networking", Morgan Kaufmann Publishers,1ed2004.5.
5. Hersent Gurle& petit, "IP Telephony, packet Pored Multimedia communication Systems", Pearsoneducation2003.6.
6. Fred Halsall and Lingana Gouda Kulkarni, "Computer Networking and the Internet" fifth edition, Pearson education 7
7. Nader F.Mir, Computer and Communication Networks, firstedition.8.
8. Larryl. Peterson & Bruce S. David, "Computer Networks: A System Approach"-1996

PCC		WIRELESS COMMUNICATION NETWORKS LABORATORY	L	T	P	C
2102CO204			0	0	4	2

Course Objectives:	
	1.To study the network simulators for implementation of different layered protocols
	2.To Implement MAC and Routing algorithms
	3.To perform simulation and analysis of various network protocols, Mobility model

List of Experiments:

1. Design and Implementation of wired network in open source simulator and performance analysis
2. Simulation of Distance Vector and Link state routing in NS2
3. Simulation of a multicast routing mechanism in NS2
4. Simulation and Performance analysis of IEEE 802.11 networks based on Throughput, PDR, Average End to End delay and Jitter
5. Simulation of IEEE 802.11 networks with Mobility and performance comparison based on Throughput, PDR, Average End to End Delay and Jitter
6. Simulation and Performance analysis of IEEE 802.16 WiMAX networks
7. Design and Simulation of Handover mechanism in WiMAX systems and performance analysis based on Packets sent and received
8. Simulation and Performance analysis of Table Driven routing protocol in Mobile Ad Hoc Networks
9. Simulation of On-Demand Routing Protocols in Mobile Adhoc networks and Performance comparison with Table Driven Protocols
10. Simulation of a security attack in Wireless Networks and analysis of performance degradation
11. Performance analysis of secure routing mechanism in Wireless Networks and study on network performance in the presence of an attack
12. Design and simulation of Wireless Sensor Networks using Zigbee and performance analysis based on battery model

Mini Project

- Design of Vehicular Ad Hoc Network and performance analysis based on different Mobility conditions
- Design of Wireless sensor networks for a specific application of Patient Health Monitoring
- Performance analysis and comparison of Battery aware models in Wireless Networks
- Performance evaluation of Medium Access Control in Heterogeneous wireless networks
- Design and simulation of GSM network and their performance analysis

	Total:	**30 Hours**

Course Outcomes:	
	After completion of the course, Student will be able to
	1. Able to analyze characteristics of analog and digital channels in a communication systems
	2. Able to understand wireless medium access mechanisms
	3. Able to analyze and test performance of routing protocols
	4. Able to analyze IP and TCP traffic in static and mobile adhoc network

2104CO205		MINI PROJECT WITH SEMINAR	L	T	P	C
			0	0	4	2

Course Objectives:	
	1. To prepare students to identify a problem for study.
	2. To do literature review of a problem.
	3. To enable to comprehend information in form of presentation both written and oral, to develop technical communication skills.
	4. To carry out modelling / conduct experiments beyond regular laboratory exercises in developing solution to the identified problem.
	5. To cultivate spirit of team work in working as a group.

	Syllabus Contents	
Each student has to choose a problem and carry out scientific systematic investigation experimentally / theoretically in suggesting a viable solution. At the end of the semester, each student has to submit a report for evaluation. Seminar presentations need to be given by the student.		
	Total:	**30 Hours**

Further Reading:	-
Course Outcomes:	
	After completion of the course, Student will be able to
	1. To critically observe the world around and identify a problem that can be solved.
	2. To develop skills of read and comprehensively analyzing the facts.
	3. To exhibit skill of presentation both orally and in written form.
	4. To get hands on experience to doing experimental/ theoretical analysis in synthesis of solution to the problem

PEC		RADIATING SYSTEMS	L	T	P	C
2103CO015			**3**	**0**	**0**	**3**

Course Objectives:	
	1. To understand the relation between the fields and to be familiar with antenna arrays.
	2. To understand signal propagation at Radio frequencies & to study aperture and Reflector Antennas.
	3. To introduce to the students the basics of Micro strip Patch Antennas and its analysis.
	4.To learn the special antenna arrays and their applications

MODULE I	**Antenna Fundamentals**	**9 Hours**
Antenna fundamental parameters, Broadband antennas and matching techniques, Balance to unbalance transformer, Introduction to numerical techniques.		
MODULE II	**Aperture Antennas**	**9 Hours**
Huygens' Principle- Radiation Equation- Directivity- Rectangular Aperture- TE10-Mode- Circular Aperture- TE11-Mode- Design Considerations- Fourier Transforms in Aperture Antenna Theory. E Plane Sectoral Horn- H-Plane Sectoral Horn- Pyramidal Horn- Conical Horn –applications.		
MODULE III	**Analysis and Design of Micro strip Patch Antennas**	**9 Hours**
Configurations- Excitations and radiation mechanism of micro strip patch antennas- Radiation resistance- Power and input impendence. Modeling of rectangular and circular micro strip patch antennas - Transmission line model and cavity model method. Circular polarization and bandwidth of microstrip patch antennas. Simulation of micro strip antennas using Simulation Software-Case studies.		
MODULE IV	**Array Antennas**	**9 Hours**
Linear array and Planar array- Characteristics, synthesis techniques – Fourier Transform method, and Taylor Line Source synthesis and Dolph- Chebyshev distributions. Circular array antennas.		
MODULE V	**Special array antennas and its measurement**	**9 Hours**
Conformal and Phased array antennas- sequential rotation and phasing, reactive loading. Array antenna measurement- Impedance, coupling, radiation pattern, scan element pattern, Gain Directivity, EIRP. Analog and Digital Beam forming, Ultra Wide Band antennas, Meta material based antennas.		
	Total:	**45 Hours**

Further reading :

Smart antennas, Advanced Horn Structures for Reflectors and Phased arrays, Efficient Shaped Beam Synthesis in phased arrays and reflectors.

Course Outcomes:	
	After completion of the course, Student will be able to
	1. Understanding of various antenna parameters.
	2. Knowledge of aperture antennas and the field associated with it.
	3.Discussion about Microstrip patch antennas and their design and simulation using software
	4. Measurement of antenna parameters and special array antennas design, learn the applications of array

References:

1. C.A Balanis., Antenna Theory,Wiley,2003
2. Robert J. Mailloux, Phased Array Antenna Handbook, Artech House, 2005.
3. HubRegtJ. Visser, Array and Phased Array Antenna Basics, John Wiley and Sons, 2005.
4. J.R James and P.S Hall, Handbook of Microstrip Antennas, Peter peregrines, 1989, www.microstripantenna.com

PEC		OPTICAL SIGNAL PROCESSING	L	T	P	C
2103CO019			3	0	0	3

Course Objectives:

1. To learn the basic signal parameters of Optical signal processing.
2. To explore the concept of different Spatial Filtering techniques
3. To understand the basic operations of spectral analysis.
4. To analyze the power spectrum of various Optic devices
5. To study about the design of homodyne and heterodyne spectrum analyzers

MODULE I	**Basic optical signal parameters**	**9 Hours**

Characterization of a general signal, Sample function, basic laws of geometrical optics, refraction by prisms, lens formula, imaging condition, optical invariants,Optical Aberrations, physical optics, Transforms: Fresnel, Fourier, Inverse Fourier and Extended Fourier, Maximum information capacity and optimum packing density

MODULE II	**Spectral Analysis**	**9 Hours**

Light sources, Spatial light modulation, spatial light modulators, The detection process in Fourier domain, system performance process, dynamic range, raster format, spectral analysis.

MODULE III	**Spatial Filtering and Filtering System**	**9 Hours**

Types of spatial filters: Binary Spatial Filters, Magnitude Spatial Filters, Phase Spatial Filters, Real valued Spatial Filters, Interferometric techniques for constructing Spatial Filters,optical signal processors and filter generation, read out module, orientation and sequential search, applications of optical spatial filter.

MODULE IV	**Acousto-Optic devices and power spectrum analysis**	**9 Hours**

Acousto-optic cellsspatial light modulators , Raman – Nath and Bragg mode, basic spectrum analyzer, aperture weighting, dynamic range and SNR, photo detector, geometric considerations, and radiometer

MODULE V	**Homodyne and heterodyne spectrum analyzers**	**9 Hours**

Overlapping of waves, photo detector size, and optimum photo detector size for 1D and 2D structure, optical radio, spatial and temporal frequencies, Distributed and local oscillator, Dynamic range comparison of heterodyne and power spectrum analyzers

Total:	**45 Hours**

Course Outcomes:

After completion of the course, Student will be able to

1. Explain optical signal processing systems using its signal parameters.
2. Measure the frequency and bandwidth using spectral analysis principle
3. Explain the spectral filtering and spatial filtering operations in optics.
4. Test the acousto optical devices using power spectral analysis
5. Correlate the homodyne and heterodyne analyzers relates with commercial applications

References:

1. P.K. Das, Optical Signal Processing Fundamentals, Narosa Publishing, 2006.
2. G. Boone, Signal processing wing optics Bradley, Oxford University Press, 2005.
3. Vanderlught, Optical Signal Processing, John Wiley & Sons, 2005.
4. Mahlke Gunther, and Goessing Peter, Fiber optic cables: Fundamentals, Cable Engineering, System, planning, John Wiley, 2001.
5. Hiroshi Murata, Handbook of Optical Fibers and Cables Marcel Dekker Inc., 1998.
6. http://www.mhhe.com/engcs/electrical/keiser 8. http://www.arcelect.com/fiber cable.htm

AUDIT COURSES

2101AU001	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:

1. Teach how to improve writing skills and level of readability
2. Tell about what to write in each section
3. Summarize the skills needed when writing a Title
4. Infer the skills needed when writing the Conclusion
5. Ensure the quality of paper at very first-time submission

MODULE I	**INTRODUCTION TO RESEARCH PAPER WRITING**	**6 Hours**

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

MODULE II	**PRESENTATION SKILLS**	**6 Hours**

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

MODULE III	**TITLE WRITING SKILLS**	**6 Hours**

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

MODULE IV	**RESULT WRITING SKILLS**	**6 Hours**

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

MODULE V	**VERIFICATION SKILLS**	**6 Hours**

Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first- time submission

Total:	**30 Hours**

FURTHER READING: -

COURSE OUTCOMES:

CO1	Understand that how to improve your writing skills and level of readability
CO2	Learn about what to write in each section
CO3	Understand the skills needed when writing a Title
CO4	Understand the skills needed when writing the Conclusion
CO5	Ensure the good quality of paper at very first-time submission

REFERENCES:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies ""New Royal book Company.
2. Sahni, Pardeep Et. Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L. , Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., New Delhi.

2101AU002	DISASTER MANAGEMENT	L	T	P	C
		2	0	0	0

Course Objectives:

1. Summarize basics of disaster
2. Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
3. Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
4. Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
5. Develop the strengths and weaknesses of disaster management approaches

MODULE I	INTRODUCTION	6 Hours

Disaster: Definition, Factors and Significance; Difference between Hazard And Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude

MODULE II	REPERCUSSIONS OF DISASTERS AND HAZARDS	6 Hours

Economic Damage, Loss of Human and Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

MODULE III	DISASTER PRONE AREAS IN INDIA	6 Hours

Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides And Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference To Tsunami; Post-Disaster Diseases and Epidemics

MODULE IV	DISASTER PREPAREDNESS AND MANAGEMENT	6 Hours

Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological And Other Agencies, Media Reports: Governmental and CommMODULEy Preparedness.

MODULE V	RISK ASSESSMENT	6 Hours

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People"s Participation in Risk Assessment. Strategies for Survival

	Total:	30 Hours

FURTHER READING: -

COURSE OUTCOMES:

CO1	Ability to summarize basics of disaster
CO2	Ability to explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
CO3	Ability to illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
CO4	Ability to describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
CO5	Ability to develop the strengths and weaknesses of disaster management approaches

REFERENCES:

1. Goel S. L., Disaster Administration And Management Text And Case Studies",Deep & Deep Publication Pvt. Ltd., New Delhi,2009.
2. NishithaRai, Singh AK, "Disaster Management in India: Perspectives, issues and strategies ""NewRoyal book Company,2007.
3. Sahni, PardeepEt.Al. ," Disaster Mitigation Experiences And Reflections", Prentice Hall OfIndia, New Delhi,2001.

2101AU003	SANSKRIT FOR TECHNICAL KNOWLEDGE	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:	
	1. Illustrate the basic sanskrit language
	2. Recognize sanskrit, the scientific language in the world.
	3. Appraise learning of sanskrit to improve brain functioning.
	4. Relate sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power.
	5. Extract huge knowledge from ancient literature.

MODULE I	ALPHABETS	6 Hours
Alphabets in Sanskrit		
MODULE II	**TENSES AND SENTENCES**	**6 Hours**
Past/Present/Future Tense - Simple Sentences		
MODULE III	**ORDER AND ROOTS**	**6 Hours**
Order - Introduction of roots		
MODULE IV	**SANSKRIT LITERATURE**	**6 Hours**
Technical information about Sanskrit Literature		
MODULE V	**TECHNICAL CONCEPTS OF ENGINEERING**	**6 Hours**
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics		
	Total:	**30 Hours**

FURTHER READING:	-

COURSE OUTCOMES:	
CO1	Understanding basic Sanskrit language
CO2	Write sentences
CO3	Know the order and roots of Sanskrit.
CO4	Know about technical information about Sanskrit literature
CO5	Understand the technical concepts of Engineering

REFERENCES:

1. “Abhyaspustakam” – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi

1. “Teach Yourself Sanskrit” Prathama Deeksha-Vempati Kutumbshastri, Rashtriya SanskritSansthanam, New Delhi Publication

2. “India‟s Glorious Scientific Tradition” Suresh Soni, Ocean books (P) Ltd., New Delhi, 2017.

2101AU004	VALUE EDUCATION	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:

1. Understand value of education and self-development
2. Imbibe good values in students
3. Let the should know about the importance of character

MODULE I **6 Hours**

Values and self-development–Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non-moral valuation. Standards and principles. Value judgements

MODULE II **8 Hours**

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, Nationaly Patriotism. Love for nature, Discipline

MODULE III **8 Hours**

Personality and Behavior Development-Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brother hood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

MODULE IV **8 Hours**

Character and Competence–Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively.

Total: **30 Hours**

FURTHER READING: -

COURSE OUTCOMES:

CO1	Knowledge of self-development
CO2	Learn the importance of Human values
CO3	Developing the overall personality.

REFERENCES:

1. Chakroborty, S.K.“Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

2101AU005	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective
2. To address the growth of Indian opinion regarding modern Indian intellectuals" constitutional
3. Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.
4. To address the role of socialism in India after the commencement of the Bolshevik Revolutionin1917and its impact on the initial drafting of the Indian Constitution.

MODULE I	**HISTORY OF MAKING OF THE INDIAN CONSTITUTION:**	**5 Hours**
History, Drafting Committee, (Composition & Working)		
MODULE II	**PHILOSOPHY OF THE INDIAN CONSTITUTION:**	**5 Hours**
Preamble, Salient Features		
MODULE III	**CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES:**	**5 Hours**
Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.		
MODULE IV	**ORGANS OF GOVERNANCE:**	**5 Hours**
Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.		
MODULE V	**LOCAL ADMINISTRATION:**	**5 Hours**
District"s Administration head: Role and Importance Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level:Role of Elected and Appointed officials, Importance of grass root democracy.		
MODULE VI	**ELECTION COMMISSION:**	**5 Hours**
Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women.		
	Total:	**30 Hours**

FURTHER READING: -

COURSE OUTCOMES:

CO1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO2	Discuss the intellectual origins of the framework of argument thatinformed the conceptualization
CO3	of social reforms leading to revolution in India.
CO4	Discuss the circumstances surrounding the foundation of the Congress Socialist Party[CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO5	Discuss the passage of the Hindu Code Bill of 1956.

REFERENCES:

1. The Constitution of India,1950 (Bare Act),Government Publication.
2. Dr.S.N.Busi, Dr.B. R.Ambedkar framing of Indian Constitution,1st Edition, 2015.
3. M.P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis,2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

2101AU006	PEDAGOGY STUDIES	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:

1. Review existing evidence on there view topic to inform programmed design and policy
2. Making under taken by the DfID, other agencies and researchers.
3. Identify critical evidence gaps to guide the development.

MODULE I	**INTRODUCTION AND METHODOLOGY**	**6 Hours**

Aims and rationale, Policy background, Conceptual framework and terminology - Theories of learning, Curriculum, Teacher education - Conceptual framework, Research questions - Overview of methodology and Searching.

MODULE II	**THEMATIC OVERVIEW**	**6 Hours**

Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries - Curriculum, Teacher education.

MODULE III	**EVIDENCE ON THE EFFECTIVENESS OF PEDAGOGICAL PRACTICES**	**6 Hours**

Methodology for the in depth stage: quality assessment of included studies - How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? - Theory of change - Strength and nature of the body **of** evidence for effective pedagogical practices - Pedagogic theory and pedagogical approaches - Teachers‟ attitudes and beliefs and Pedagogic strategies.

MODULE IV	**PROFESSIONAL DEVELOPMENT**	**6 Hours**

Professional development: alignment with classroom practices and follow up support - Peer support - Support from the head teacher and the commMODULEy - Curriculum and assessment - Barriers to learning: limited resources and large class sizes

MODULE V	**RESEARCH GAPS AND FUTURE DIRECTIONS**	**6 Hours**

Research design – Contexts – Pedagogy - Teacher education - Curriculum and assessment - Dissemination and research impact.

Total:	**30 Hours**

FURTHER READING: -

COURSE OUTCOMES:

CO1	What pedagogical practices are being used by teachers informal and informal classrooms in developing countries?
CO2	What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
CO3	How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

REFERENCES:

1. Ackers J, HardmanF (2001) Classroom interaction in Kenyan primary schools, Compare, 31(2): 245-261.
2. Agrawal M (2004)Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36(3):361-379.
3. Akyeampong K (2003) Teacher training in Ghana-does it count? Multi-site teacher education research project (MUSTER) country report 1.London:DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33(3): 272–282.
5. Alexander RJ(2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M(2003) Read India: Amass scale, rapid, „learning to read‟ campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf

2101AU007	STRESS MANAGEMENT BY YOGA	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:	
	1. To achieve overall health of body and mind
	2. To overcome stress

MODULE I		10 Hours
Eight parts of yoga.(Ashtanga)		
MODULE II		**10 Hours**
Yam and Niyam - Do`s and Don"t's in life - i) Ahinsa, satya, astheya, bramhacharya and aparigraha,		
MODULE III		**10 Hours**
Asan and Pranayam - Various yog poses and their benefits for mind & body - Regularization ofbreathing techniques and its effects-Types of pranayam		
	Total:	**30 Hours**

FURTHER READING:	-
COURSE OUTCOMES:	
CO1	Develop healthy mind in a healthy body thus improving social health also
CO2	Improve efficiency

REFERENCES:

1. Yogic Asanas for Group Tarining-Part-I":Janardan Swami Yoga bhyasi Mandal, Nagpur
2. Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

2101AU008	PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	L	T	P	C
		2	0	0	0

Course Objectives:	
	1. To learn to achieve the highest goal happily
	2. To become a person with stable mind, pleasing personality and determination
	3. To awaken wisdom in students

MODULE I	**10 Hours**
Neetisatakam-holistic development of personality - Verses- 19,20,21,22 (wisdom) - Verses- 29,31,32 (pride & heroism) – Verses- 26,28,63,65 (virtue) - Verses- 52,53,59 (dont˝s) - Verses- 71,73,75,78 (d0˝s)	
MODULE II	**10 Hours**
Approach to day to day work and duties - Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48 - Chapter 3- Verses 13, 21, 27, 35 Chapter 6-Verses 5,13,17,23, 35 - Chapter 18-Verses 45, 46, 48.	
MODULE III	**10 Hours**
Statements of basic knowledge - Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18 - Personality of role model - shrimad bhagwad geeta - Chapter2-Verses 17, Chapter 3-Verses 36,37,42 -Chapter 4-Verses 18, 38,39 Chapter18 – Verses 37,38,63	
Total:	**30 Hours**

FURTHER READING:	-
COURSE OUTCOMES:	
CO1	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
CO2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity
CO3	Study of Neet is hatakam will help in developing versatile personality of students.

REFERENCES:

1. Gopinath, Rashtriya Sanskrit Sansthanam P, Bhartrihari˝s Three Satakam, Niti- sringar-vairagya, New Delhi,2010
2. Swami Swarupananda , Srimad Bhagavad Gita, Advaita Ashram, Publication Department,Kolkata, 2016.

2101AU009	UNNAT BHARAT ABHIYAN	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:

1. Unnat Bharat Abhiyan is inspired by the vision of transformational change in rural development processes by leveraging knowledge institutions to help build the architecture of an Inclusive India.
2. The Mission of Unnat Bharat Abhiyan is to enable higher educational institutions to work with the people of rural India in identifying development challenges and evolving appropriate solutions for accelerating sustainable growth.
3. It also aims to create a virtuous cycle between society and an inclusive academic system by providing knowledge and practices for emerging professions and to upgrade the capabilities of both the public and the private sectors in responding to the development needs of rural India

MODULE 1 **10 Hours**

Introduction. Holistic development of a village – Economic, Social, Human, Governance, Basic Amenities, Environmental aspects. Vision and mission of UBA. Activities of Unnat Bharat Abhiyan. Expediting the process of indigenous, sustainable rural development with effective support from professional institutes of higher education. Building capacity in institutes of Higher Education for research, training and development of technologies relevant to national needs, especially those of rural India. Creating the Requisite Structure to Cope with the Challenge.

MODULE 2 **10 Hours**

National Steering Committee for UBA (NSC - UBA). The Coordinating Institution for UBA (CI-UBA) and its Responsibilities. Identification and Role of Mentoring Institutions (MI - UBA). Identification and Role of Subject Expert Groups (SEG - UBA). UBA Participating Institutions in General (PIs - UBA).

MODULE 3 **10 Hours**

Methodology of Intervention and Monitoring. Expected outcomes from UBA. Mechanism for Providing the Base-level funding from MHRD. Various Sources of Funding for the Actual Cluster Development Work. Status of Steps Already Completed towards Setting up the Structural Network of UBA. Major activities so far. Action Plans.

Total: 30 Hours

REFERENCES:

1. https://www.rcisgbau.in/pdf/UBA_concept_note.pdf
2. https://unnatbharatabhiyan.gov.in/documents
3. https://unnatbharatabhiyan.gov.in:8443/introduction
4. https://unnatbharatabhiyan.gov.in:8443/new-website/https://unnatbharatabhiyan.gov.in:8443/app/webroot/files/general-documents/Unnat%20Bharat%20Abhiyan-%20Brochure%202016.pdf