Second Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	PCC	CEC201	Antennas and Radiating Systems	3	0	0	3
2.	PCC	CEC202	Advanced Digital Signal Processing	3	0	0	3
3.	DE	Prog. Specific Elective	Suggestive Choice Based Subject III	3	0	0	3
4.	DE	Prog. Specific Elective	Suggestive Choice Based Subject IV	3	0	0	3
5.		Lab 3	Antennas and Radiating Systems lab	0	0	4	2
6.		Lab 4	Advanced Digital Signal Processing Lab	0	0	4	2
7.			Mini Project	0	0	4	2
8.	OE	Aud 2	Audit course 2	2	0	0	0
			Total	14	0	12	18

Suggestive Choice Based Subjects

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1	DE	CED201	Satellite Communication	3	0	0	3
2	DE	CED203	Internet of Things	3	0	0	3
3	DE	CED202	Voice and data networks	3	0	0	3
4	DE	CED205	Markov Chain and Queuing System	3	0	0	3
5	DE	CED204	MIMO System	3	0	0	3
6	DE	CED206	Programmable Networks – SDN, NFV	3	0	0	3
7	OE	Aud 2	Constitution of India	2	0	0	0
8	OE	Aud 2	Pedagogy Studies	2	0	0	0
9	OE	Aud 2	Stress Management by Yoga	2	0	0	0
10	OE	Aud 2	Personality Development through Life Enlightenment Skills	2	0	0	0

Second Semester Syllabus

TITLE OF COURSE: ANTENNAS AND RADIATING SYSTEMS
COURSE CODE: CEC201
L-T-P SCHEME: 3-0-0
COURSE CREDITS: 3

Course Outcomes (CO):
At the end of this course, students will be able to
CO1: Compute the far-field distance, radiation pattern and gain of an antenna for a given current distribution.
CO2: Estimate the input impedance, efficiency and ease of match for antennas.
CO3: Compute the array factor for an array of identical antennas.
CO4: Design antennas and antenna arrays for various desired radiation pattern characteristics.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓	✓	✓	✓								✓
CO3	✓	✓	✓					✓				✓
CO4	✓	✓	✓								✓	✓

Course Contents:

Unit 1: Types of Antennas: Wire antennas, Aperture antennas, Microstrip antennas, Array antennas Reflector antennas, Lens antennas, Radiation Mechanism, Current distribution on thin wire antenna. Fundamental Parameters of Antennas: Radiation Pattern, Radiation Power Density, Radiation Intensity, Directivity, Gain, Antenna efficiency, Beam efficiency, Bandwidth, Polarization, Input Impedance, radiation efficiency, Antenna Vector effective length, Friis Transmission equation, Antenna Temperature.

Unit 2: Linear Wire Antennas: Infinitesimal dipole, Small dipole, Region separation, Finite length dipole, half-wave dipole, Ground effects. Loop Antennas: Small Circular loop, Circular Loop of constant current, Circular loop with the non-uniform current.

Unit 3: LinearArrays: Two element array, N Element array: Uniform Amplitude and spacing, Broadside and End fire array, Super directivity, Planar array, Design consideration.

Unit 4: Aperture Antennas: Huygen's Field Equivalence principle, radiation equations, Rectangular Aperture, Circular Aperture. Horn Antennas: E-Plane, H-plane Sectoral horns, Pyramidal and Conical horns.

Unit 5: Microstrip Antennas: Basic Characteristics, Feeding mechanisms, Method of analysis, Rectangular Patch, Circular Patch.

Unit 6: Reflector Antennas: Plane reflector, parabolic reflector, Cassegrain reflectors, Introduction to MIMO.

References

- Constantine A. Balanis, “Antenna Theory Analysis and Design”, John Wiley & Sons, 4th edition, 2016.
- John D Kraus, Ronald J Marhefka, Ahmad S Khan, “Antennas for All Applications”, Tata McGraw-Hill, 2002.
- R.C.Johnson and H.Jasik, “Antenna Engineering hand book”, Mc-Graw Hill, 1984.
- I.J.Bhal and P.Bhartia, “Micro-strip antennas”, Artech house, 1980.

TITLE OF COURSE: ANTENNAS AND RADIATING SYSTEMS LABORATORY COURSE CODE: CEC291
L-T-P SCHEME: 0-0-4
COURSE CREDITS: 2

Course Outcomes (CO):
Upon successful completion of this course, students should be able to:
CO1: Determine specifications, design, construct and test antenna.
CO2: Explore and use tools for designing, analyzing and testing antennas. These tools include Antenna design and analysis software, network analyzers, spectrum analyzers, and antenna pattern measurement techniques.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓	✓	✓	✓								✓

Hands-on experiments related to the course contents CEC201

TITLE OF COURSE: ADVANCED DIGITAL SIGNAL PROCESSING
COURSE CODE: CEC202
L-T-P: 3-0-0
CREDITS: 3

Course Outcomes (CO):
Upon successful completion of this course, students should be able to:
CO1: To understand theory of different filters and algorithms
CO2: To understand theory of multi-rate DSP, solve numerical problems and write algorithms
CO3: To understand theory of prediction and solution of normal equations
CO4: To know applications of DSP at block level.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓			✓								✓
CO3	✓		✓						✓			✓
CO4	✓			✓	✓							✓

Course Contents:

Unit 1: Overview of DSP, Characterization in time and frequency, FFT Algorithms, Digital filter design and structures: Basic FIR/IIR filter design &structures, design techniques of linear phase FIR filters,IIR filters by impulse invariance, bilinear transformation, FIR/IIR Cascaded lattice structures, parallel realization of IIR.

Unit 2: Multi rate DSP, Decimators and Interpolators, Sampling rate conversion, multistage decimator & interpolator, polyphase filters, QMF, digital filter banks, Applications in subband coding.

Unit 3: Linear prediction & optimum linear filters, stationary random process, forward-backward linear prediction filters, solution of normal equations, AR Lattice and ARMA Lattice-Ladder Filters, Wiener Filters for Filtering and Prediction.

Unit 4: Adaptive Filters, Applications, Gradient Adaptive Lattice, Minimum mean square criterion, LMS algorithm, Recursive Least Square algorithm

Unit 5: Estimation of Spectra from Finite-Duration Observations of Signals. Nonparametric Methods for Power Spectrum Estimation, Parametric Methods for Power Spectrum Estimation, Minimum-Variance Spectral Estimation, Eigen analysis Algorithms for Spectrum Estimation.

Unit 6: Application of DSP & Multi-rate DSP, Application to Radar, introduction to wavelets, application to image processing, design of phase shifters, DSP in speech processing & other applications

Text Books:

1. J.G.Proakis and D.G.Manolakis"Digital signal processing: Principles, Algorithm and Applications", 4th Edition, Prentice Hall, 2007
2. N. J. Fliege, "Multirate Digital Signal Processing: Multirate Systems -Filter Banks –

Wavelets", 1st Edition, John Wiley and Sons Ltd, 1999.
3. Bruce W. Suter, "Multirate and Wavelet Signal Processing",1st Edition, Academic Press, 1997.
4. M. H. Hayes, "Statistical Digital Signal Processing and Modeling", John Wiley & Sons Inc., 2002.
5. S.Haykin, "Adaptive Filter Theory", 4th Edition, Prentice Hall, 2001.
6. D.G.Manolakis, V.K. Ingle and S.M.Kogon, "Statistical and Adaptive Signal Processing", McGraw Hill, 2000

TITLE OF COURSE: ADVANCED DIGITAL SIGNAL PROCESSING LAB
COURSE CODE: CEC292
L-T-P: 0-0-4
CREDITS: 2

Course Outcomes (CO):
At the end of this course, students will be able to
CO1: Design different digital filters in software
CO2: Apply various transforms in time and frequency
CO3: Perform decimation and interpolation

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									✓
CO2	✓	✓	✓									✓
CO3	✓	✓	✓		✓							✓

Hands-on experiments related to the course contents CC204

TITLE OF COURSE: SATELLITE COMMUNICATION
COURSE CODE: CED201
L-T-P: 3-0-0
CREDITS: 3

Course Outcomes (CO):

At the end of this course, students will be able to

CO1: Visualize the architecture of satellite systems as a means of high speed, high range communication system.

CO2: State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple access schemes.

CO3: Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions.

Mapping of course outcomes with program outcomes

Course Outcome												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√					√	√		√	√	
CO2	√	√	√	√	√				√	√		
CO3	√			√	√		√	√		√	√	

Course Contents:

Module 1:
Architecture of Satellite Communication System: Principles and architecture of satellite Communication, Brief history of Satellite systems, advantages, disadvantages, applications, and frequency bands used for satellite communication and their advantages/drawbacks.

Module 2:
Orbital Analysis: Orbital equations, Kepler's laws of planetary motion, Apogee and Perigee for an elliptical orbit, evaluation of velocity, orbital period, angular velocity etc of a satellite, concepts of Solar day and Sidereal day.

Module 3:
Satellite sub-systems: Architecture and Roles of various sub-systems of a satellite system such as Telemetry, tracking, command and monitoring (TTC & M), Attitude and orbit control system (AOCS), Communication sub-system, power sub-systems, antenna sub-system.

Module 4:

Typical Phenomena in Satellite Communication: Solar Eclipse on satellite, its effects, remedies for Eclipse, Sun Transit Outage phenomena, its effects and remedies, Doppler frequency shift phenomena and expression for Doppler shift.

Module 5:
Satellite link budget: Flux density and received signal power equations, Calculation of System noise temperature for satellite receiver, noise power calculation, Drafting of satellite link budget and C/N ratio calculations in clear air and rainy conditions, Case study of Personal Communication system (satellite telephony) using LEO.

Module 6:
Modulation and Multiple Access Schemes used in satellite communication. Typical case studies of VSAT, DBS-TV satellites and few recent communication satellites launched by NASA/ ISRO. GPS

References:

1. Timothy Pratt and Others, “Satellite Communications”, Wiley India, 2nd edition,2010.
2. S. K. Raman, “Fundamentals of Satellite Communication”, Pearson Education India, 2011.
3. Tri T. Ha, “Digital Satellite Communications”, Tata McGraw Hill, 2009.
4. Dennis Roddy, “Satellite Communication”, McGraw Hill, 4th Edition, 2008.

TITLE OF COURSE: INTERNET OF THINGS
COURSE CODE: CED203
L-T-P: 3-0-0
CREDITS: 0

At the end of this course, students will be able to
CO 1: Understand what IoT technologies are used for today, and what is required in certain scenarios.
CO 2: Understand the types of technologies that are available and in use today and can be utilized to implement IoT solutions.
CO 3: Apply these technologies to tackle scenarios in teams of using an experimental platform for implementing prototypes and testing them as running applications.

Mapping of course outcomes with program outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√	√						√	
CO2	√	√	√	√	√			√			√	
CO3	√	√	√	√	√						√	

Course Contents:

Module 1:
Smart cities and IoT revolution, Fractal cities, From IT to IoT, M2M and peer networking concepts, Ipv4 and IPV6.

Module 2:
Software Defined Networks SDN, From Cloud to Fog and MIST networking for IoT communications, Principles of Edge/P2P networking, Protocols to support IoT communications, modular design and abstraction, security and privacy in fog.

Module 3:
Wireless sensor networks: introduction, IOT networks (PAN, LAN and WAN), Edge resource pooling and caching, client-side control and configuration.

Module 4:
Smart objects as building blocks for IoT, Opensource hardware and Embedded systems platforms for IoT, Edge/gateway, IO drivers, C Programming, multithreading concepts.

Module 5:

Operating systems requirement of IoT environment, study of mbed, RIoT, and Contiki operating systems, Introductory concepts of big data for IoT applications.

Module 6:

Applications of IoT, connected cars IoT Transportation, Smart Grid and Healthcare sectors using IoT, Security and legal considerations, IT Act 2000 and scope for IoT legislation

References:

1. A Bahaga, V. Madisetti, “Internet of Things- Hands on approach”, VPT publisher, 2014.
2. McEwen, H. Cassimally, “Designing the Internet of Things”, Wiley, 2013.
3. CunoPfister, “Getting started with Internet of Things”, Maker Media, 1st edition, 2011.
4. Samuel Greenguard, “Internet of things”, MIT Press, 2015.

Web resources:

5. http://www.datamation.com/open-source/35-open-source-tools-for-the-internet-of-things1.html
6. https://developer.mbed.org/handbook/AnalogIn
7. http://www.libelium.com/50_sensor_applications/
8. M2MLabs Mainspring http://www.m2mlabs.com/framework
9. Node-RED http://nodered.org/

TITLE OF COURSE: VOICE AND DATA NETWORKS
COURSE CODE: CED202
L-T-P: 3-0-0
CREDITS: 0

Course Outcomes (CO):
Upon successful completion of this course, students should be able to:
CO1: Protocol, algorithms, trade-offs rationale..
CO2: Routing, transport, DNS resolutions
CO3: Network extensions and next generation architectures.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											
CO2		✓	✓	✓								
CO3		✓	✓									

Course Contents:
Unit 1: Network Design Issues, Network Performance Issues, Network Terminology, centralized and distributed approaches for networks design, Issues in design of voice and data networks.

Unit 2: Layered and Layer less Communication, Cross layer design of Networks, Voice Networks (wired and wireless) and Switching, Circuit Switching and Packet Switching, Statistical Multiplexing.

Unit 3: Data Networks and their Design, Link layer design- Link adaptation, Link Layer Protocols, Retransmission. Mechanisms (ARQ), Hybrid ARQ (HARQ), Go Back N, Selective Repeat protocols and their analysis.

Unit 4: Queuing Models of Networks , Traffic Models , Little's Theorem, Markov chains, M/M/1 and other Markov systems, Multiple Access Protocols , Aloha System , Carrier Sensing , Examples of Local area networks,

Unit 5: Inter-networking, Bridging, Global Internet , IP protocol and addressing , Sub netting , Classless Inter domain Routing (CIDR) , IP address lookup , Routing in Internet. End to End Protocols, TCP and UDP. Congestion Control , Additive Increase/Multiplicative Decrease , Slow Start, Fast Retransmit/ Fast Recovery,

Unit 6: Congestion avoidance, RED TCP Throughput Analysis, Quality of Service in Packet Networks. Network Calculus, Packet Scheduling Algorithms.

References

- D. Bertsekas and R. Gallager, “Data Networks”, 2nd Edition, Prentice Hall, 1992.
- L. Peterson and B. S. Davie, “Computer Networks: A Systems Approach”,5th Edition, Morgan Kaufman, 2011.
- Kumar, D. Manjunath and J. Kuri, “Communication Networking: An analytical approach”, 1st Edition, Morgan Kaufman, 2004.
- Walrand, “Communications Network: A First Course”, 2nd Edition, McGraw Hill, 2002.
- Leonard Kleinrock, “Queueing Systems, Volume I: Theory”, 1st Edition, John Wiley and Sons, 1975.
- Aaron Kershenbaum, “Telecommunication Network Design Algorithms”, McGraw Hill, 1993.
- Vijay Ahuja, “Design and Analysis of Computer Communication Networks”, McGraw Hill, 1987

TITLE OF COURSE: MARKOV CHAIN AND QUEUING SYSTEM
COURSE CODE: CEO301
L-T-P: 3-0-0
CREDITS: 0

Course Outcomes (CO):
Upon successful completion of this course, students should be able to:

CO1: Understand Markov Chains and regenerative processes used in modelling a wide variety of systems and phenomena.

CO2: Model a system as queuing system with some aspect of the queue governed by a random process.

CO3: Understand telecommunication systems modelling using Markov chains with special emphasis on developing queuing models.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓								
CO2		✓	✓		✓	✓						
CO3		✓	✓		✓	✓						

Course Contents:

Unit 1: Introduction: Review of basic probability, properties of nonnegative random variables, laws of large numbers and the Central Limit Theorem.

Unit 2: Renewal Processes: Basic definitions, recurrence times, rewards and renewal reward theorem, point processes, Poisson process, Walds equation, Blackwell's theorem.

Unit 3: Discrete time Markov chains: definitions and properties, matrix representation, Perron-Frobenius theory.

Unit 4: Continuous time Markov chains: basic definitions, Q-matrix, birth-death processes, quasi birth death processes.;Embedded Markov processes, semi Markov processes, reversible Markov chains, Random walks.

Unit 5: Fundamental queuing results: Little's theorem, invariance of the mean delay, Conservation law. Markovian queues: Jackson and BCMP networks, numerical Algorithms. M/G/1 & G/M/1 queues and G/G/1 queues.

Unit 6: Advanced queuing models: priority, vacation and retrials in queues.

Text Books

- Cliffs, “Stochastic Modelling and the Theory Queues”, Prentice Hall, 1989.
- P.Bremaud, “Markov Chains”, Springer-Verlag, 1999.
- E.Seneta, “Non Negative Matrices and Markov Chains”, Springer Series in Statistics, Springer,1981.
- R.Gallager, “Discrete Stochastic Processes”, Kluwer Academic Press, 1996.
- L.Kleinrock, “Queuing Systems”, vols I and II, John Wiley and Sons 1976.

TITLE OF COURSE: MIMO SYSTEM
COURSE CODE: CED204
L-T-P: 3-0-0
CREDITS: 3

Course Outcomes (CO):

Develop knowledge about the different channel modelling and propagation, MIMO Capacity, space-time coding, MIMO receivers, MIMO for multi-carrier systems (e.g. MIMO-OFDM), multi-user communications, multi-user MIMO

CO1: Student's ability to Understand channel modelling and propagation, MIMO Capacity, space-time coding, MIMO receivers, MIMO for multi-carrier systems (e.g. MIMO-OFDM), multi-user communications, multi-user MIMO.

CO2: Student's ability to Understand cooperative and coordinated multi-cell MIMO, introduction to MIMO in 4G (LTE, LTE-Advanced, WiMAX).

CO3: Perform Mathematical modelling and analysis of MIMO systems

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓	✓		✓		✓	✓				✓
CO2				✓			✓	✓				✓
CO3		✓	✓				✓	✓				✓

Course Contents:

Module-1: Introduction to Multi-antenna Systems, Motivation, Types of multi-antenna systems, MIMO vs. multi-antenna systems.

Module-2: Diversity, Exploiting multipath diversity, Transmit diversity, Space-time codes, The Alamouti scheme, Delay diversity, Cyclic delay diversity, Space-frequency codes, Receive diversity, The rake receiver, Combining techniques, Spatial Multiplexing, Spectral efficiency and capacity, Transmitting independent streams in parallel, Mathematical notation

Module-3: The generic MIMO problem, Singular Value Decomposition, Eigenvalues and eigenvectors, Equalising MIMO systems, Disadvantages of equalising MIMO systems, Pre-distortion in MIMO systems, Disadvantages of pre-distortion in MIMO systems, Pre-coding and combining in MIMO systems, Advantages of pre-coding and combining, Disadvantages of pre-coding and combining, Channel state information.

Module-4: Codebooks for MIMO, Beamforming, Beamforming principles, Increased spectrum efficiency, Interference cancellation, Switched beamformer, Adaptive beamformer, Narrowband beamformer, Wideband beamformer.

Module-5: Case study: MIMO in LTE, Codewords to layers mapping, Pre-coding for spatial multiplexing, Pre-coding for transmit diversity, Beamforming in LTE, Cyclic delay diversity-based pre-coding, Pre-coding codebooks, Propagation Channels, Time & frequency channel dispersion, AWGN and multipath propagation channels, Delay spread values and time variations, Fast and slow fading environments, Complex baseband multipath channels, Narrowband and wideband channels, MIMO channel models.

Module-6: Channel Estimation, Channel estimation techniques, Estimation and tracking, Training based channel estimation, Blind channel estimation, Channel estimation architectures, Iterative channel estimation, MMSE channel estimation, Correlative channel sounding, Channel estimation in single carrier systems, Channel estimation for CDMA, Channel estimation for OFDM.

Text Books

1. Claude Oestges, Bruno Clerckx, "MIMO Wireless Communications: From Real-world Propagation to Space-time Code Design", Academic Press, 1st edition, 2010.
2. Mohinder Janakiraman, “Space-Time Codes and MIMO Systems”, Artech House Publishers, 2004

TITLE OF COURSE: PROGRAMMABLE NETWORKS-SDN, NFV
COURSE CODE: CED206
L-T-P: 3-0-0
CREDITS: 3

Course Outcomes (CO):

Develop knowledge about the different Programmable Networks, History and Evolution of Software Defined Networking (SDN) and Separation of Control Plane and Data Plane as well as Active Networking

CO1: Student's ability to Understand advanced concepts in Programmable Networks

CO2: Student's ability to Understand Software Defined Networking, an emerging Internet architectural framework

CO3: Implement the main concepts, architectures, algorithms, protocols and applications in SDN and NFV.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓	✓		✓		✓	✓				
CO2				✓			✓	✓				
CO3		✓	✓				✓	✓				

Course Contents:

Module-1: Introduction to Programmable Networks, History and Evolution of Software Defined Networking (SDN), Fundamental Characteristics of SDN, Separation of Control Plane and Data Plane, Active Networking.

Module-2: Control and Data Plane Separation: Concepts, Advantages and Disadvantages, the basics of OpenFlow protocol**.**

Module-3: Network Virtualization: Concepts, Applications, Existing Network Virtualization Framework, Mininet A simulation environment for SDN.

Module-4: Control Plane: Overview, Existing SDN Controllers including Floodlight and Open Daylight projects. Customization of Control Plane: Switching and Firewall Implementation using SDN Concepts. Data Plane: Software-based and Hadrware-based; Programmable Network Hardware.

Module-5: Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs. Network Functions Virtualization (NFV) and Software Defined Networks: Concepts, Implementation and Applications.

Module-6: Data Center Networks: Packet, Optical and Wireless Architectures, Network Topologies. Use Cases of SDNs: Data Centers, Internet Exchange Points, Backbone Networks, Home Networks, Traffic Engineering.

Text Books

1. Thomas D. Nadeau, Ken Gray, "SDN: Software Defined Networks, An Authoritative Review of Network Programmability Technologies", O'Reilly Media, August 2013.
2. Paul Goransson, Chuck Black, Timothy Culver. "Software Defined Networks: A Comprehensive Approach", Morgan Kaufmann Publishers, 2016.
3. Fei Hu, "Network Innovation through OpenFlow and SDN: Principles and Design", CRC Press, 2014.
4. Vivek Tiwari, "SDN and OpenFlow for Beginners", Amazon Digital Services, Inc., ASIN: 2013.
5. Nick Feamster, Jennifer Rexford and Ellen Zegura, "The Road to SDN: An Intellectual History of Programmable Networks" ACM CCR April 2014.

TITLE OF COURSE: CONSTITUTION OF INDIA
COURSE CODE: A201
L-T-P: 2-0-0
CREDITS: 0

Course Outcomes (CO):
It is a well-balanced course that focuses on the four core language skills:
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 argument framework that informed the conceptualization of social reforms leading to a revolution in India.
CO3: 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.
CO4: Discuss the passage of the Hindu Code Bill of 1956.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									✓
CO2	✓	✓	✓									✓
CO3	✓	✓	✓		✓							✓
CO4	✓	✓	✓	✓				✓				✓

Course Contents:

Unit1: History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working)

Unit 2: Philosophy of the Indian Constitution: Preamble, Salient Features

Unit 3: Contours of Constitutional Rights & Duties: 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.

Unit 4: Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

Unit 5: Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CE of Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Panchayat: Position and role. Block-level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass-root democracy.

Unit 6: Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books:

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.

TITLE OF COURSE: PEDAGOGY STUDIES
COURSE CODE: A201
L-T-P: 2-0-0
CREDITS: 0

Course Outcomes (CO):
Students will be able to understand:
CO1: What pedagogical practices are being used by teachers in formal 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?

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓	✓	✓	✓								✓
CO3	✓	✓	✓								✓	✓

Course Contents:

Unit 1: Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology, Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

Unit 2: Thematic overview: Teachers use pedagogical practices in formal and informal classrooms in developing countries, curriculum, teacher education.

Unit 3: Evidence on the effectiveness of pedagogical practices, 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.

Unit 4: Professional development: alignment with classroom practices and follow-up support, Peer support, support from the headteacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes.

Unit 5: Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

Text Books:

1. Ackers J, Hardman F (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.

TITLE OF COURSE: STRESS MANAGEMENT BY YOGA
COURSE CODE: A201
L-T-P: 2-0-0
CREDITS: 0

Course Outcomes (CO):

Students will be able to:

CO1: Develop a healthy mind in a healthy body, thus improving social health also

CO2: Improve efficiency.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓			✓							✓
CO2	✓	✓		✓				✓				✓

Course Contents:
Unit 1: Definitions of Eight parts of yog. (Ashtanga)

Unit 2: Yam and Niyam. Do`s and Don't's in life. i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan.

Unit 3: Asan and Pranayam i) Various yog poses and their benefits for mind & body, ii)Regularization of breathing techniques and their effects-Types of pranayama.

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

TITLE OF COURSE: Personality Development through Life Enlightenment Skills
COURSE CODE: A201
L-T-P: 0-0-2
CREDITS: 0

Course Outcomes (CO):
Students will be able to:
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 Neetishatakam will help in developing versatile personalities of students.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓			✓				✓				✓
CO3	✓	✓	✓									✓

Course Contents:
Unit 1: 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 (do's)

Unit 2: 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.

Unit 3: 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

Text Books
1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.