M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS 2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name: Antennas and Radiating Systems.							**Course Code :** PCC-ETCME201		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
3	-	-	3	3	25	75	-	-	100
IA- In-Semester Assessment - Paper Duration –**1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									
Prerequisite: Under graduate subjects related to Communication									

Course Objective:

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

- Explain types of antenna with fundamental parameters of antennas.
- Analyze the Linear Array antennas with two elements and N elements.
- Explain the Aperture Antennas.
- Analyze the rectangular and circular Microstrip antennas.
- Explain the Reflector Antennas.

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

Sr. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1	Compute the far field distance, radiation pattern and gain of an antenna for given current distribution.	Apply(A)
2	Estimate the input impedance, efficiency and ease of match for antennas.	Apply(A)
3	Compute the array factor for an array of identical antennas.	Analysis (AN)
4	Design antennas and antenna arrays for various desired radiation pattern characteristics.	Analysis (AN)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Types of Antennas: Wire antennas, Aperture antennas, Micro strip 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.	**07 hrs**	Understand(U)
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 non uniform current.	**07 hrs**	Apply(A)
3	Linear Arrays: Two element array, N Element array: Uniform Amplitude and spacing, Broadside and End fire array, Super directivity, Planar array, Design consideration.	**06 hrs**	Analysis (AN)
4	Aperture Antennas: Huygen's Field Equivalence principle, radiation equations, Rectangular Aperture, Circular Aperture. Horn Antennas: E-Plane, H-plane Spectral horns, Pyramidal and Conical horns.	**08 hrs**	Understand(U)
5	Micro strip Antennas: Basic Characteristics, Feeding mechanisms, Method of analysis, Rectangular Patch, Circular Patch.	**07 hrs**	Analysis (AN)
6	Reflector Antennas: Plane reflector, parabolic reflector, Cassegrain reflectors, Introduction to MIMO.	**04 hrs**	Apply(A)

Reference Books:

- 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.

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS 2019)

<table>
<tr><td colspan="6">ME (Electronics and Telecommunication Engineering)</td><td colspan="4">SEM : II</td></tr>
<tr><td colspan="6">Course Name :Advanced Digital Signal Processing</td><td colspan="4">Course Code : PCC-ETCME202</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR/OR</td><td>TW</td><td rowspan="2">100</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td></tr>
<tr><td colspan="10">IA- In-Semester Assessment - Paper Duration – 1.5 Hours
ESE- End Semester Examination - 3 Hours</td></tr>
<tr><td colspan="10">Prerequisite: Under graduate subjects related to Communication</td></tr>
</table>

Course Objective:

The objective of the course is to

- Revise the concepts of Digital Signal Processing.
- Introduce the concept of multirate Digital Signal Processing
- Introduce the concept of prediction theory and solution of normal equations
- Study the different spectrum estimation techniques
- Understand the application of digital signal processing to different areas.

Course Outcomes:

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

Sr. No.	Course Outcomes	Cognitive levels as per Bloom's taxonomy
1.	To explain the working of different filters and algorithms	Understand (U)
2.	To describe of multirate DSP, solve numerical problems and write algorithms	Analyze (AN)
3.	To describe the theory of prediction solution of normal equations	Understand (U)
4	To describe the solution of normal equations and solve numerical problems	Understand (U)
5	To describe different methods of Spectrum Estimation	Understand (U)
6	To describe applications of DSP at block level.	Understand (U)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's taxonomy
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.	08hrs	Apply (A)
2	Multi rate DSP, Decimators and Interpolators, Sampling rate conversion, multistage decimator & interpolator, poly phase filters, QMF, digital filter banks, Applications in sub band coding.	08hrs	Understand (U)
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.	04hrs	Understand (U)
4	Adaptive Filters, Applications, Gradient Adaptive Lattice, Minimum mean square criterion, LMS algorithm, Recursive Least Square algorithm	08hrs	Understand (U)
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.	10hrs	Understand (U)
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	10hrs	Understand (U)

Reference Books:

- J.G.Proakis and D.G.Manolakis"Digital signal processing: Principles, Algorithm andApplications", 4th Edition, Prentice Hall, 2007.
- N. J. Fliege, "Multirate Digital Signal Processing: Multirate Systems -Filter Banks – Wavelets", 1st Edition, John Wiley and Sons Ltd, 1999.
- Bruce W. Suter, "Multirate and Wavelet Signal Processing",1st Edition, Academic Press, 1997.
- M. H. Hayes, "Statistical Digital Signal Processing and Modeling", John Wiley & Sons Inc., 2002.
- S.Haykin, "Adaptive Filter Theory", 4th Edition, Prentice Hall, 2001.
- D.G.Manolakis, V.K. Ingle and S.M.Kogon, "Statistical and Adaptive Signal Processing", McGraw Hill, 2000

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS 2019)

<table>
<tr><td colspan="8">ME (Electronics and Telecommunication Engineering)</td><td>SEM : II</td></tr>
<tr><td colspan="8">Course Name :Program Elective 3: Internet of Things</td><td>Course Code : PEC-ETCME2012</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="4">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="4">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td>Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>ISA</td><td>ESE</td><td>PR/OR</td><td>TW</td><td rowspan="2">100</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td></tr>
<tr><td colspan="9">ISA- In-Semester Assessment - Paper Duration – 1.5 Hours
ESE- End Semester Examination - 3 Hours</td></tr>
<tr><td colspan="9">Prerequisite: Under graduate subjects related to Embedded System and Communication.</td></tr>
</table>

Course Objective:

This course is organized in a way to help students to grasp the basic concepts of Internet of Things It describes the IoT communication, it's building block and operating system requirement. Lastly it covers IoT applications, security and legal considerations.

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

Sr. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1	Understand what IoT technologies are used for today, and what is required in certain scenarios.	Understand(U)
2	Understand the types of technologies that are available and in use today and can be utilized to implement IoT solutions.	Understand(U)
3	Apply these technologies to tackle scenarios in teams of using an experimental platform for implementing prototypes and testing them as running applications.	Apply(A)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Smart cities and IoT revolution, Fractal cities, From IT to IoT, M2M and peer networking concepts, Ipv4 andIPV6.	08hrs	Understand (U)
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.	08hrs	Understand (U)
3	Wireless sensor networks: introduction, IOT networks (PAN, LAN and WAN), Edge resource pooling and caching, client side control and configuration.	04hrs	Apply(A)
4	Smart objects as building blocks for IoT, Open source hardware and Embedded systems platforms for IoT, Edge/gateway, IO drivers, C Programming, multithreading concepts.	08hrs	Apply(A)
5	Operating systems requirement of IoT environment, study of mbed, RIoT, and Contiki operating systems, Introductory concepts of big data for IoT applications.	10hrs	Understand (U)
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.	10hrs	Apply(A)

Reference Books:

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

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS 2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name :Program Elective 4: MIMO System							**Course Code :** PEC- ETCME2022		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
3	-	-	3	3	25	75	-	-	100
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									
Prerequisites: Mobile Communication system, Wireless Networks									

Course Objective:

At the end of this course, students shall be able to understand MIMO for multi-carrier, multi-user communication. To describe generic MIMO problems and Pre-coding and combining in MIMO systems. To illustrate introduction to MIMO in 4G (LTE, LTE-Advanced, WiMAX).To analyze mathematical model of MIMO systems.

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

Sr. No.	**Course Outcomes**	**Cognitive levels as per Bloom's Taxonomy**
1	Explain diversity and Spatial Multiplexing in MIMO	Understand(U)
2	Illustrate space time coding for MIMO	Understand(U)
3	Describe generic MIMO problem and Pre-coding and combining in MIMO systems	Understand(U)
4	Classify between different beam forming techniques.	Understand(U)
5	Apply concepts of MIMO in 4G (LTE, LTE-Advanced, WiMAX).	Apply (A)
6	Analyze mathematical modeling of MIMO.	Analyze (AN)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Introduction to Multi-antenna Systems, Motivation, Types of multi-antenna systems, MIMO vs. multi-antenna systems.	06hrs	Understand (U)
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	08hrs	Understand (U)
3	The generic MIMO problem, Singular Value Decomposition, Eigen values and eigenvectors, Equalizing MIMO systems, Disadvantages of equalizing 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.	08hrs	Understand (U)
4	Codebooks for MIMO, Beamforming, Beamforming principles, Increased spectrum efficiency, Interference cancellation, Switched beam former, Adaptive beam former, Narrowband beam former, Wideband beam former	07hrs	Understand (U)
5	Case study: MIMO in LTE, Code words 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	08hrs	Apply (A)
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.	08hrs	Analyze (AN)

Reference Books:

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

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS 2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name : Stress Management by Yoga							**Course Code :** AC- ETCME007		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	**50**
2	-	-	2	2	15	35	-	-	
IA- In-Semester Assessment - Paper Duration – **1 Hours** **ESE-** End Semester Examination - **2 Hours**									
Prerequisite: Basics of Statistics									

Course Objective:

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

- To achieve overall health of body and mind
- To overcome stress

Course Outcomes:

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

- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Definitions of Eight parts of yog. (Ashtanga)	4	Apply (A)
2	Yam and Niyam. Do`s and Don't's inlife. i) Ahinsa, satya, astheya, bramhacharya andaparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	4	Analyze (An)
3	Asan and Pranayam i) Various yog poses and their benefits for mind &body ii)Regularization of breathing techniques and its effects-Types of pranayam	4	Apply (A)

Reference Books:

- 'Yogic Asanas for Group Tarining-Part-I" : Janardan Swami Yogabhyasi Mandal, Nagpur
- "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaitshrama (Publication Department), Kolkata

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							SEM : II		
Course Name : Computational Lab3: Antennas and Radiating Laboratory							Course Code : LC-ETCME201		
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Practical/Oral (25)	Term Work (50)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	PR/OR	TW	50
-	-	4	4	2	-	-	25	25	
IA- In-Semester Assessment - Paper Duration – 1.5 Hours ESE- End Semester Examination - 3 Hours									

Each Laboratory assignment will be done by an individual student. The Faculty teaching core subject will be required to propose the respective Laboratory assignments. These will be essentially hands-on practical /Case Study

Suggested list of Assignments:

1. Simulation of half wave dipole antenna.
2. Simulation of change of the radius and length of dipole wire on frequency of resonance of antenna.
3. Simulation of quarter wave, full wave antenna and comparison of their parameters.
4. Simulation of monopole antenna with and without ground plane.
5. Study the effect of the height of the monopole antenna on the radiation characteristics of the antenna.
6. Simulation of a half wave dipole antenna array.
7. Study the effect of change in distance between elements of array on radiation pattern of dipole array.
8. Study the effect of the variation of phase difference 'beta' between the elements of the array on the radiation pattern of the dipole array.
9. Case study.

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name : Computational Lab4: Advanced Digital Signal Processing lab							**Course Code :** LC-ETCME202		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (50)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	**50**
-	-	4	4	2	-	-	25	25	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									

Each Laboratory assignment will be done by an individual student. The Faculty teaching core subject will be required to propose the respective Laboratory assignments. These will be essentially hands-on practical /Case Study

Suggested list of Assignments:

1. Basic Signal Representation
2. Correlation Auto And Cross
3. Stability Using Hurwitz Routh Criteria
4. Sampling FFT Of Input Sequence
5. Butterworth Low pass And High pass Filter Design
6. Chebychev Type I,II Filter
7. State Space Matrix from Differential Equation
8. Normal Equation Using Levinson Durbin
9. Decimation And Interpolation Using Rationale Factors
10. Maximally Decimated Analysis DFT Filter
11. Cascade Digital IIR Filter Realization
12. Convolution And M Fold Decimation &PSD Estimator
13. Estimation Of PSD
14. Inverse Z Transform
15. Group Delay Calculation
16. Separation Of T/F
17. Parallel Realization of IIR filter

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name :Advanced Computer Architecture							**Course Code :**PEC-ETCME2014		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	100
3	-	-	3	3	25	75	-	-	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									
Prerequisite: Undergraduate subjects related to Signal Processing.									

Course Objective:

This course helps students to Understand, identify and formalize architectural level characterization of P-DSP hardware, Design, programming (assembly and C), and testing code using Code Composer Studio environment, Apply DSP hardware for Control, Audio and Video Signal processing applications

and Understand major areas and challenges in DSP based embedded systems

Course Outcomes:

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

- Understand parallelism and pipelining concepts, the design aspects and challenges.
- Evaluate the issues in vector and array processors.
- Study and analyze the high performance scalable multithreaded and multiprocessor systems.

Detailed Syllabus:

Module No.	Topics	Hrs.
1	Parallel Processing and Pipelining Processing- Architectural Classification, Applications of parallel processing, Instruction level Parallelism and Thread Level Parallelism, Explicitly Parallel Instruction Computing (EPIC) Architecture	**08hrs**
2	Pipeline Architecture-Principles and implementation of Pipelining, Classification of pipelining processors, Design aspect of Arithmetic and Instruction pipelining, Pipelining hazards and resolving techniques, Data buffering techniques, Advanced pipelining techniques, Software pipelining, VLIW (Very Long Instruction Word)	**08hrs**
3	Vector and Array Processor- Issues in Vector Processing, Vector performance modeling, SIMD Computer Organization, Static Vs Dynamic network, Parallel Algorithms for Array Processors: Matrix Multiplication.	
4	Multiprocessor Architecture - Loosely and Tightly coupled multiprocessors, Inter Processor communication network, Time shared bus, Multiport Memory Model, Memory contention and arbitration techniques, Cache coherency and bus snooping, Massively Parallel Processors (MPP).	**10hrs**
5	Multithreaded Architecture- Multithreaded processors, Latency hiding techniques, Principles of multithreading, Issues and solutions, Parallel Programming Techniques: Message passing program development.	**08hrs**
6	Parallel algorithms for multiprocessors- Classification and performance of parallel algorithms, operating systems for multiprocessors systems, Message passing libraries for parallel programming interface, PVM (in distributed memory system), Message Passing Interfaces (MPI).	**04 hrs**

Reference Books:

- Kai Hwang, Faye A. Briggs, “Computer Architecture and ParallelProcessing” McGraw Hill Education, 2012.
- Kai Hwang, “Advanced Computer Architecture”, McGraw Hill Education, 1993.
- William Stallings, “Computer Organization and Architecture, Designing for Performance” Prentice Hall, 6th edition, 2006.
- Kai Hwang, “ScalableParallelComputing”, McGraw Hill Education, 1998.
- Harold S. Stone “High-Performance Computer Architecture”, Addison-Wesley, 1993.

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name :IOT and Applications							**Course Code** : PEC-ETCME2015		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	100
3	-	-	3	3	25	75	-	-	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									
Prerequisite: Undergraduate subjects related to Signal Processing.									

Course Objective:

This course helps students to understand the concept of IOT and M2M, Study IOT architecture and applications in various fields and Study the security and privacy issues in IOT.

Course Outcomes:

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

- Understand the concept of IOT and M2M
- Study IOT architecture and applications in various fields
- Study the security and privacy issues in IOT.

Detailed Syllabus:

Module No.	Topics	Hrs.
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.	**07hrs**
2	M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.	**09hrs**
3	IoT Architecture -State of the Art – Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.	**04hrs**
4	IoT Applications for Value Creations 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 IoT Application and Value for Industry, Home Management, eHealth.	**09hrs**
5	Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues	**10hrs**
6	Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security	**09 hrs**

Reference Books:

- Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014.
- Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1stEdition, Apress Publications, 2013.
- CunoPfister, “Getting Started with the Internet of Things”, O Reilly Media, 2011.

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name :Audio Processing							**Course Code :**PEC-ETCME2016		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	100
3	-	-	3	3	25	75	-	-	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									
Prerequisite: Undergraduate subjects related to Signal Processing.									

Course Objectives:

This course helps students to understand different characteristics of Speech, Identify and analyze different speech analysis system and Write algorithms for Recognition of speech.

Course Outcomes:

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

- Understand different characteristics of Speech.
- Identify and analyze different speech analysis system.
- Write algorithms for Recognition of speech.

Detailed Syllabus:

Module No.	Topics	Hrs.
1	Principle Characteristics of Speech: Linguistic information, Speech and Hearing, Speech production mechanism, Acoustic characteristic of speech Statistical Characteristics of speech. Speech production models, Linear Separable equivalent circuit model, Vocal Tract and Vocal Cord Model.	**08hrs**
2	Speech Analysis and Synthesis Systems: Digitization, Sampling, Quantization and coding, Spectral Analysis, Spectral structure of speech, Autocorrelation and Short Time Fourier transform, Window function, Sound Spectrogram, Mel frequency Cepstral Coefficients, Filter bank and Zero Crossing Analysis, Analysis –by-Synthesis, Pitch Extraction.	**07hrs**
3	Linear Predictive Coding Analysis: Principle of LPC analysis, Maximum likelihood spectral estimation, Source parameter estimation from residual signals, LPC Encoder and Decoder, PARCOR analysis and Synthesis, Line Spectral Pairs, LSP analysis and Synthesis.	**05hrs**
4	Speech Coding: Reversible coding, Irreversible coding and Information rate distortion theory, coding in time domain: PCM, ADPCM, Adaptive Predictive coding, coding in Frequency domain: Sub band coding, Adaptive transform coding, Vector Quantization, Code Excited Linear Predictive Coding (CELP).	**08hrs**
5	Speech Recognition: Principles of speech recognition, Speech period detection, Spectral distance measure, Structure of word recognition system, Dynamic Time Warping (DTW), Theory and implementation of Hidden Markov Model (HMM).	**09hrs**
6	Speaker recognition: Human and Computer speaker recognition Principles Text dependent and Text Independent speaker recognition systems. Applications of speech Processing.	**11hrs**

Reference Books:

1. SadaokiFurui, “Digital Speech Processing, Synthesis and Recognition” 2nd Edition, Taylor & Francis, 2000.
2. Rabiner and Schafer, “Digital Processing of Speech Signals”, Pearson Education, 1979.

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name :Multispectral Signal Analysis							**Course Code :**PEC-ETCME2024		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	100
3	-	-	3	3	25	75	-	-	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									
Prerequisite: Undergraduate subjects related to Signal Processing.									

Course Objectives:

This course helps students to understand Select appropriate hyper spectral data for a particular application, Understand basic concepts of data acquisition and image processing tasks required for multi and hyper spectral data analysis, Learn techniques for classification and analysis of multi and hyper spectral data

Course Outcomes:

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

- Select appropriate hyper spectral data for a particular application.
- Understand basic concepts of data acquisition and image processing tasks required for multi and hyper spectral data analysis.
- Learn techniques for classification and analysis of multi and hyperspectral data

Detailed Syllabus:

Module No.	**Topics**	**Hrs.**
1	Hyperspectral Sensors and Applications: Introduction, Multi-spectral Scanning Systems (MSS), Hyperspectral Systems, Airborne sensors, Spaceborne sensors, Ground Spectroscopy, Software for Hyperspectral Processing, Applications, Atmosphere and Hydrosphere, Vegetation, Soils and Geology, Environmental Hazards and Anthropogenic Activity	**08hrs**

2	Overview of Image Processing: Introduction, Image File Formats, Image Distortion and Rectification, Radiometric Distortion, Geometric Distortion and Rectification, Image Registration, Image Enhancement, Point Operations, Geometric Operation, Image Classification, Supervised Classification, Unsupervised Classification, Crisp Classification Algorithms, Fuzzy Classification Algorithms, Classification Accuracy Assessment, Image Change Detection, Image Fusion, Automatic Target Recognition	**07hrs**
3	Mutual Information:A Similarity Measure for Intensity Based Image Registration: Introduction, Mutual Information Similarity Measure,Joint Histogram Estimation Methods, Two-Step Joint Histogram Estimation, One-Step Joint Histogram Estimation, Interpolation Induced Artifacts, Generalized Partial Volume Estimation of Joint Histograms, Optimization Issues in the Maximization of MI	**05hrs**
4	Independent Component Analysis: Introduction, Concept of ICA, ICA Algorithms, Preprocessing using PCA, Information Minimization Solution for ICA, ICA Solution through Non-Gaussianity Maximization, Application of ICA to Hyperspectral Imagery, Feature Extraction Based Model, Linear Mixture Model Based Model, An ICA algorithm for Hyperspectral Image Processing, Applications using ICA.	**08hrs**
5	Support Vector Machines : Introduction, Statistical Learning Theory, Empirical Risk Minimization, Structural Risk Minimization, Design of Support Vector Machines, Linearly Separable Case, Linearly Non-Separable Case, Non-Linear Support Vector Machines, SVMs for Multiclass Classification, One Against the Rest Classification, Pair wise Classification, Classification based on Decision Directed Acyclic Graph and Decision Tree Structure, Multiclass Objective Function, optimization Methods , Applications using SVM.	**09hrs**
6	Markov Random Field Models: Introduction, MRF and Gibbs Distribution, Random Field and Neighborhood ,Cliques, Potential and Gibbs Distributions, MRF Modeling in Remote Sensing Applications, Optimization Algorithms, Simulated Annealing, Metropolis Algorithm, Iterated Conditional Modes Algorithm	**11hrs**

Reference Books:

1. Pramod K. Varshney, Manoj K. Arora, “Advanced Image Processing Techniques for Remotely Sensed Hyperspectral Data”, Springer, 2013.
2. S. Svanberg, “Multi-spectral Imaging– from Astronomy to Microscopy – from Radio waves to Gamma rays”, Springer Verlag, 2009

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name :Digital Design and Verification							**Course Code :**PEC-ETCME2025		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	100
3	-	-	3	3	25	75	-	-	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									
Prerequisite: Undergraduate subjects related to Signal Processing.									

Course Objectives:

This course helps students to understand Familiarity of Front end design and verification techniques and create reusable test environments, Verify increasingly complex designs more efficiently and effectively and Use EDA tools like Cadence, Mentor Graphics.

Course Outcomes:

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

- Familiarity of Front end design and verification techniques and create reusable test environments.
  - Verify increasingly complex designs more efficiently and effectively.
  - Use EDA tools like Cadence, Mentor Graphics.

Detailed Syllabus:

Module No.	Topics	Hrs.
1	Revision of basic Digital systems: Combinational Circuits, Sequential Circuits, Logic families.Synchronous FSM and asynchronous design, Metastability, Clock distribution and issues, basic building blocks like PWM module, pre-fetch unit, programmable counter, FIFO, Booth's multiplier, ALU, Barrel shifter etc.	**08hrs**
2	Verilog/VHDL Comparisons and Guidelines, Verilog: HDL fundamentals, simulation, and test- bench design, Examples of Verilog codes for combinational and sequential logic, Verilog AMS	**07hrs**
3	System Verilog and Verification: Verification guidelines, Data types, procedural statements and routines, connecting the test bench and design, Assertions, Basic OOP concepts, Randomization, Introduction to basic scripting language: Perl, Tcl/Tk	**05hrs**

4	Current challenges in physical design: Roots of challenges, Delays: Wire load models Generic PD flow, Challenges in PD flow at different steps, SI Challenge - Noise & Crosstalk, IR Drop, Process effects: Process Antenna Effect &Electromigration	**08hrs**
5	Programmable Logic Devices: Introduction, Evolution: PROM, PLA, PAL, Architecture of PAL's, Applications, Programming PLD's, FPGA with technology: Antifuse, SRAM, EPROM, MUX, FPGA structures, and ASIC Design Flows, Programmable Interconnections, Coarse grained reconfigurable devices	**09hrs**
6	IP and Prototyping: IP in various forms: RTL Source code, Encrypted Source code, Soft IP, Netlist, Physical IP, and Use of external hard IP during prototyping, Case studies, and Speed issues. Testing of logic circuits: Fault models, BIST, JTAG interface	**11hrs**

Reference Books:

- Douglas Smith, "HDL Chip Design: A Practical Guide for Designing, Synthesizing & Simulating ASICs & FPGAs Using VHDL or Verilog", Doone publications, 1998.
- Samir Palnitkar, "Verilog HDL: A guide to Digital Design and Synthesis", Prentice Hall, 2nd Edition, 2003.
- Doug Amos, Austin Lesea, Rene Richter, "FPGA based Prototyping Methodology Manual", Synopsys Press, 2011.
- Christophe Bobda, "Introduction to Reconfigurable Computing, Architectures, Algorithms and Applications", Springer, 2007.
- Janick Bergeron, "Writing Testbenches: Functional Verification of HDL Models", Second Edition, Springer, 2003.

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name :Biomedical Signal Processing							**Course Code :** PEC- ETCME2026		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	100
3	-	-	3	3	25	75	-	-	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									
Prerequisite: Undergraduate subjects related to Signal Processing.									

Course Objectives:

This course helps students to understand different types of biomedical signal, Identify and analyze different biomedical signals and find applications related to biomedical signal processing

Course Outcomes:

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

- Understand different types of biomedical signal.
- Identify and analyze different biomedical signals.
- Find applications related to biomedical signal processing

Detailed Syllabus:

Module No.	Topics	Hrs.
1	Acquisition, Generation of Bio-signals, Origin of bio-signals, Types of bio-signals, Study of diagnostically significant bio-signal parameters	
2	Electrodes for bio-physiological sensing and conditioning, Electrode-electrolyte interface, polarization, electrode skin interface and motion artifact, biomaterial used for electrode, Types of electrodes (body surface, internal, array of electrodes, microelectrodes), Practical aspects of using electrodes, Acquisition of bio-signals (signal conditioning) and Signal conversion (ADC's DAC's) Processing, Digital filtering	**07hrs**
3	Biomedical signal processing by Fourier analysis, Biomedical signal processing by wavelet (time- frequency) analysis, Analysis (Computation of signal parameters that are diagnostically significant)	**05hrs**
4	Classification of signals and noise, Spectral analysis of deterministic, stationary random signals and non-stationary signals, Coherent treatment of various biomedical signal processing methods and applications.	**08hrs**
5	Principal component analysis, Correlation and regression, Analysis of chaotic signals Application areas of Bio–Signals analysis Multiresolution analysis(MRA) and wavelets, Principal component analysis(PCA), Independent component analysis(ICA)	**09hrs**
6	Pattern classification–supervised and unsupervised classification, Neural networks, Support vector Machines, Hidden Markov models. Examples of biomedical signal classification examples.	**11hrs**

Reference Books:

- W. J. Tompkins, "Biomedical Digital Signal Processing", Prentice Hall, 1993.
- Eugene N Bruce, "Biomedical Signal Processing and Signal Modeling", John Wiley & Son's publication, 2001.
- Myer Kutz, "Biomedical Engineering and Design Handbook, Volume I", McGraw Hill, 2009.
- D C Reddy, "Biomedical Signal Processing", McGraw Hill, 2005.
- Katarzyn J. Blinowska, JaroslawZygierewicz, "Practical Biomedical Signal Analysis Using MATLAB", 1st Edition, CRC Press, 2011.

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

<table>
<tr><td colspan="6">ME (Electronics and Telecommunication Engineering)</td><td colspan="4">SEM : II</td></tr>
<tr><td colspan="6">Course Name : Satellite Communication</td><td colspan="4">Course Code : PEC-ETCME2011</td></tr>
<tr><td colspan="6">Teaching Scheme (Program Specific)</td><td colspan="4">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="6">Modes of Teaching / Learning / Weightage</td><td colspan="4">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR/OR</td><td>TW</td><td rowspan="2">100</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td></tr>
<tr><td colspan="10">IA- In-Semester Assessment - Paper Duration – 1.5 Hours
ESE- End Semester Examination - 3 Hours</td></tr>
<tr><td colspan="10">Prerequisite: Principle Communication, Digital Communication, Computer Network, Fiber Optic, Satellite Communication</td></tr>
</table>

Course Objective:

At the end of this course, students should be able to describe the architecture of satellite systems. To explain various aspects related to satellite systems. To design link budget for the given parameters and conditions.

Course Outcomes:

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

- Visualize the architecture of satellite systems as a means of high speed, high range communication system.
- State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple access schemes.
- Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions.

Detailed Syllabus:

Module No.	Topics	Hrs.
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	08 hrs
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.	07 hrs
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.	07 hrs
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.	08 hrs
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.	08 hrs
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.	07 hrs

Reference Books:

- Timothy Pratt and Others, "Satellite Communications", Wiley India, 2nd edition,2010.
- S. K. Raman, "Fundamentals of Satellite Communication", PearsonEducation India, 2011.
- Tri T. Ha, "Digital Satellite Communications", Tata McGraw Hill, 2009.
- Dennis Roddy, "Satellite Communication", McGraw Hill, 4th Edition, 2008.

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name :Program Elective 1 : Voice and Data Networks							**Course Code :** PEC- ETCME2013		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
3	-	-	3	3	25	75	-	-	100
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									
Prerequisite: Principles of Communication, Digital Communication, Computer Networks and Application, Fiber optic, Satellite Communication, Mobile Communication.									

Course Objective:

At the end of this course, students shall be able to understand issues in design of voice and data networks. To illustrate layered voice and data networks and design data link layer, network layer and transport layer with understanding of the protocols. To describe network extensions and next generation architectures.

Course Outcomes:

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

- Protocol, algorithms, trade-offs rationale.
- Routing, transport, DNS resolutions
- Network extensions and next generation architectures.

Detailed Syllabus:

Module No.	Topics	Hrs.
1	Network Design Issues, Network Performance Issues, Network Terminology, centralized and distributed approaches for networks design, Issues in design of voice and data networks.	**7hrs**
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.	**7hrs**
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.	**8hrs**
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,	**7hrs**
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,	**8hrs**
6	Congestion avoidance, RED TCP Throughput Analysis, Quality of Service in Packet Networks. Network Calculus, Packet Scheduling Algorithms.	**8 hrs**

Reference Books:

- 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

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

<table>
<tr><td colspan="7">ME (Electronics and Telecommunication Engineering)</td><td colspan="3">SEM : II</td></tr>
<tr><td colspan="7">Course Name :Program Elective2: Markov Chains and Queueing Systems</td><td colspan="3">Course Code : PEC- ETCME2021</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR/OR</td><td>TW</td><td rowspan="2">100</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td></tr>
<tr><td colspan="10">IA- In-Semester Assessment - Paper Duration – 1.5 Hours
ESE- End Semester Examination - 3 Hours</td></tr>
<tr><td colspan="10">Prerequisite: Principles of Communication, Digital Communication, Computer Networks and Application, Fiber optic, Satellite Communication, Mobile Communication.</td></tr>
</table>

Course Objective:

At the end of this course, students should be able to understand basic probability concepts and Renewal Processes. To illustrate continuous time and discrete time Markov chains. To explain fundamental queuing models and advanced queuing models

Course Outcomes:

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

- Understand Markov Chains and regenerative processes used in modelling a wide variety of systems and phenomena.
- Model a system as queuing system with some aspect of the queue governed by a random process.
- Understand telecommunication systems modelling using Markov chains with special emphasis on developing queuing models.

Detailed Syllabus:

Module No.	Topics	Hrs.
1	Introduction: Review of basic probability, properties of nonnegative random variables, laws of large numbers and the Central Limit Theorem.	**08hrs**
2	Renewal Processes: Basic definitions, recurrence times, rewards and renewal reward theorem, point processes, Poisson process, Walds equation, Blackwell's theorem.	**07hrs**
3	Discrete time Markov chains: definitions and properties, matrix representation, Perron- Frobenius theory.	**05hrs**
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.	**08hrs**
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.	**09hrs**
6	Advanced queuing models: priority, vacation and retrials in queues.	

Reference 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.

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name :Program Elective 2 : Programmable Networks - SDN, NFV							**Course Code :** PEC- ETCME2023		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
3	-	-	3	3	25	75	-	-	100
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									
Prerequisites: Principles of Communication, Digital Communication, Computer Networks and Application, Fiber optic, Satellite Communication, Mobile Communication.									

Course Objective:

At the end of this course, students shall be able to describe concepts in Programmable Networks. To illustrate Software Defined Networking, an emerging Internet architectural framework. To implement protocols and applications in SDN and NFV.

Course Outcome:

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

- Understand advanced concepts in Programmable Networks.
- Understand Software Defined Networking, an emerging Internet architectural framework.
- Implement the main concepts, architectures, algorithms, protocols and applications in SDN and NFV.

Detailed Syllabus:

Module No.	Topics	Hrs.
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.	**8hrs**
2	Control and Data Plane Separation: Concepts, Advantages and Disadvantages, the basics of Open Flow protocol.	**8hrs**
3	Network Virtualization: Concepts, Applications, Existing Network Virtualization Framework, Mininet A simulation environment for SDN.	**5hrs**
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.	**8hrs**
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.	**8hrs**
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.	**8hrs**

Reference Books:

- Thomas D. Nadeau, Ken Gray, “SDN: Software Defined Networks, An Authoritative Review of Network Programmability Technologies”, O'Reilly Media, August 2013.
- Paul Goransson, Chuck Black, Timothy Culver. “Software Defined Networks: A Comprehensive Approach”, Morgan Kaufmann Publishers, 2016.
- Fei Hu, “Network Innovation through OpenFlow and SDN: Principles and Design”, CRC Press, 2014.
- Vivek Tiwari, “SDN and OpenFlow for Beginners”, Amazon Digital Services, Inc., ASIN: , 2013.
- Nick Feamster, Jennifer Rexford and Ellen Zegura, “The Road to SDN: An Intellectual History of Programmable Networks” ACM CCR April 2014.
- Open Networking Foundation (ONF) Documents, https://www.opennetworking.org, 2015.
- OpenFlow standards, http://www.openflow.org, 2015.

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** I		
Course Name : English for Research Paper Writing							**Course Code :** AC-ETCME001		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	50
2	-	-	2	-	-	-	-	50	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									

Course Objective:

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

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

Course Outcomes:

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

- How to enhance your writing skills and level of readability
- Know what to write in each section
- Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission

Detailed Syllabus:

Module No.	Topics	Hrs.
1	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	04hrs
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	04hrs
3	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.	04hrs
4	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,	04hrs
5	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	04hrs
6	Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission	04hrs

Reference Books:

- Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
- Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
- Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book .
- Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name : Disaster Management							**Course Code :** AC- ETCME002		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	50
2	-	-	2	-	-	-	-	50	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									

Course Objective:

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

- Analyze a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Analyze evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Know standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Analyze strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

Course Outcomes:

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

- Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

Detailed Syllabus:

Module No.	Topics	Hrs.
1	Introduction Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	04 hrs
2	Repercussions Of Disasters And Hazards: 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,	04 hrs
3	Disaster Prone Areas In India 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 and Epidemics	04 hrs
4	Disaster Preparedness And Management 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 Community Preparedness.	04 hrs
5	Risk Assessment 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.	04 hrs
6	Disaster Mitigation Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.	04 hrs

Reference Books:

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

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name : Sanskrit for Technical Knowledge							**Course Code :** AC- ETCME003		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	50
2	-	-	2	-	-	-	-	50	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									

Course Objective:

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

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Course Outcomes:

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

- Understanding basic Sanskrit language
- Ancient Sanskrit literature about science & technology can be understood
- Being a logical language will help to develop logic in students

Detailed Syllabus:

Module No.	Topics	Hrs.
1	Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences	08hrs
2	Order Introduction of roots Technical information about Sanskrit Literature	08hrs
3	Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics	08hrs

Reference Books:

- "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
- "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
- "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name : Value Education							**Course Code :** AC- ETCME004		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	50
2	-	-	2	-	-	-	-	50	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									

Course Objective:

Students should be able to

- Understand value of education and self- development
- Imbibe good values in students
- Understand the importance of character

Course Outcomes:

Students will be able to

- Knowledge of self-development
- Learn the importance of Human values 3.Developing the overall personality

Detailed Syllabus:

Module No.	Topics	Hrs.
1	Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgments	6hrs
2	Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature ,Discipline	6hrs

3	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 labor. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature	6hrs
4	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	6hrs

Reference Books:

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

M.E. Semester –II
Choice Based Credit Grading Scheme(CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name : Constitution of India							**Course Code :** AC- ETCME005		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	50
2	-	-	2	-	–	–	-	50	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									

Course Objective:

Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes:

Students will be able to

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- 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.
- Discuss the passage of the Hindu Code Bill of 1956.

Detailed Syllabus:

Module No.	Topics	Hrs.
1	History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working)	04hrs

2	Philosophy of the Indian Constitution: Preamble Salient Features	04hrs
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.	04hrs
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	04hrs
5	Local Administration: District's Administration head: Role and Importance. Municipalities: Introduction, Mayor and role of Elected Representative, CE of Municipal Corporation. Panchayati 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	04hrs
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.	04hrs

Reference Books

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

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name : Pedagogy Studies							**Course Code :** AC- ETCME006		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	50
2	-	-	2	-	–	–	-	50	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									

Course Objective:

Students will be able to:

- Review existing evidence on the review topic to inform programmed design and policy making undertaken by the DFID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Course Outcomes:

Students will be able to understand:

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

Detailed Syllabus:

Module No.	Topics	Hrs.
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.	06hrs
2	Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.	06hrs
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.	06hrs
4	Research gaps and future directions Research design Contexts Pedagogy Teacher education Curriculum and assessment Dissemination and research impact.	06hrs

Reference:

- Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
- Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
- Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
- 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.
- Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
- Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
- www.pratham.org/images/resource%20working%20paper%202.pdf.

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name : Stress Management by Yoga							**Course Code :** AC- ETCME007		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	50
2	-	-	2	-	–	–	-	50	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									

Course Objective :

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

- To achieve overall health of body and mind
- To overcome stress

Course Outcomes:

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

- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency

Module No.	Topics	Hrs.
1	Definitions of Eight parts of yog. (Ashtanga)	08hrs
2	Yam and Niyam. Do`s and Don't's in life iii) Ahinsa, satya, astheya, bramhacharya and aparigraha iv) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	08hrs
3	• Asan and Pranayam iii) Various yog poses and their benefits for mind & body ii) Regularization of breathing techniques and its effects-Types of pranayam	08hrs

Reference Books:

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

M.E. Semester –II
Choice Based Credit Grading Scheme(CBCGS2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name : Personality Development through Life Enlightenment Skills.							**Course Code :** AC- ETCME008		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	50
2	-	-	2	-	-	-	-	50	
IA- In-Semester Assessment - Paper Duration – **1.5 Hours** **ESE-** End Semester Examination - **3 Hours**									

Course Objective:

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

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

Course Outcomes:

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

- Study of Shrimad- Bhagwad- Geeta will help the student in developing his personality and achieve the highest goal in life
- The person who has studied Geeta will lead the nation and mankind to peace and prosperity
- Study of Neetishatakam will help in developing versatile personality of students.

Detailed Syllabus:

Module No.	Topics	Hrs.
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)	08hrs

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.	08hrs
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	08hrs

Reference Books:

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

M.E. Semester –II
Choice Based Credit Grading Scheme (CBCGS 2019)

ME (Electronics and Telecommunication Engineering)							**SEM :** II		
Course Name :Mini Project							**Course Code :** LC-ETCME203		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
4	-	-	4	4	25	75	-	-	100

Course Objective:

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

- The objective of the course is to deliver an understanding of fundamental concepts of contemporary / emerging technology for various processes and systems.
- The course also aims to enable students to develop and share knowledge effectively in oral and written form and formulate documents.

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

SN	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1	Understand of contemporary / emerging technology for various processes and systems.	Understand (U)
2	Share knowledge effectively in oral and written form and formulate documents.	Analyze (AN)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	The students are required to search / gather the material / information on a specific a topic comprehend it and present / discuss in the class.	**04hrs**	Understand (U)