# R19 COURSE STRUCTURE AND SYLLABUS

## I YEAR I – SEMESTER

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
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<tbody>
<tr>
<td><strong>Professional Core - I</strong></td>
<td>Microcontrollers &amp; Programmable Digital Signal Processors</td>
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<td><strong>Professional Core - II</strong></td>
<td>System Design with Embedded Linux</td>
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<td><strong>Professional Elective - I</strong></td>
<td>1. Programming Languages for Embedded Software</td>
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<td></td>
<td>2. AI &amp; Machine Learning</td>
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<td></td>
<td>3. Computer Vision</td>
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<td><strong>Professional Elective - II</strong></td>
<td>1. Communications Buses &amp; Interfaces</td>
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<td></td>
<td>2. Parallel Processing</td>
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<td>3. Advanced Computer architecture</td>
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<td>System Design with Embedded Linux Lab</td>
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## I YEAR II – SEMESTER

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<td><strong>Professional Core - III</strong></td>
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<td>2. VLSI Signal Processing</td>
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<td>3. SOC Architecture</td>
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<td>2. Network Security and Cryptography</td>
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<td>3. Physical Design Automation</td>
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<tr>
<td><strong>Lab - III</strong></td>
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<td><strong>Lab - IV</strong></td>
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Audit Course 1 & 2:
1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Constitution of India
6. Pedagogy Studies
7. Stress Management by yoga
8. Personality Development Through Life Enlightenment Skills
Course Outcomes: At the end of this course, students will be able to
   1. Compare and select ARM processor core based SoC with several features/peripherals based on requirements of embedded applications.
   2. Identify and characterize architecture of Programmable DSP Processors
   3. Develop small applications by utilizing the ARM processor core and DSP processor based platform.

UNIT-I

UNIT-II
Exceptions, Types, Priority, Vector Tables, Interrupt Inputs and Pending behaviour, Fault Exceptions, Supervisor and Pendable Service Call, Nested Vectored Interrupt Controller, Basic Configuration, SYSTICK Timer, Interrupt Sequences, Exits, Tail Chaining, Interrupt Latency.

UNIT-III
LPC 17xx microcontroller- Internal memory, GPIOs, Timers, ADC, UART and other serial interfaces, PWM, RTC, WDT.

UNIT-IV
Programmable DSP (P-DSP) Processors: Harvard architecture, Multi port memory, architectural structure of P-DSP- MAC unit, Barrel shifters, Introduction to TI DSP processor family

UNIT-V
VLIW architecture and TMS320C6000 series, architecture study, data paths, cross paths, Introduction to Instruction level architecture of C6000 family, Assembly Instructions memory addressing, for arithmetic, logical operations

TEXTBOOKS:

REFERENCES:
   2. Steve furber, “ARM System-on-Chip Architecture”, Pearson Education
Course Outcomes: At the end of this course, students will be able to
1. Familiarity of the embedded Linux development model.
2. Write, debug, and profile applications and drivers in embedded Linux.
3. Understand and create Linux BSP for a hardware platform

UNIT-I

UNIT-II
Embedded Linux Architecture, Kernel Architecture – HAL, Memory manager, Scheduler, File System, I/O and Networking subsystem, IPC, User space, Start-up sequence

UNIT-III
Board Support Package Embedded Storage: MTD, Architecture, Drivers, Embedded File System Embedded Device Drivers: Communication between user space and kernel space drivers, Character and Block Device Drivers, Interrupt handling, Kernel modules Embedded Drivers: Serial, Ethernet, I2 C, USB, Timer, Kernel Modules

UNIT-IV
Porting Applications Real-Time Linux: Linux and Real time, Programming, Hard Real-time Linux

UNIT-V
Building and Debugging: Bootloaders, Kernel, Root file system, Device Tree

TEXT BOOKS:

REFERENCES:
Course Outcomes: At the end of this course, students will be able to
1. Write an embedded C application of moderate complexity.
2. Develop and analyze algorithms in C++.
3. Differentiate interpreted languages from compiled languages.

UNIT-I
Embedded ‘C’ Programming
- Bitwise operations, Dynamic memory allocation, OS services
- Linked stack and queue, Sparse matrices, Binary tree
- Interrupt handling in C, Code optimization issues
- Writing LCD drives, LED drivers, Drivers for serial port communication
- Embedded Software Development Cycle and Methods (Waterfall, Agile)

UNIT-II
CPP Programming: ‘cin’, ‘cout’, formatting and I/O manipulators, new and delete operators,
Defining a class, data members and methods, ‘this’ pointer, constructors, destructors, friend
function, dynamic memory allocation

UNIT-III
Overloading and Inheritance: Need of operator overloading, overloading the assignment,
overloading using friends, type conversions, single inheritance, base and derived classes, friend
classes, types of inheritance, hybrid inheritance, multiple inheritance, virtual base class,
polymorphism, virtual functions,

UNIT-IV
Templates: Function template and class template, member function templates and template
arguments, Exception Handling: syntax for exception handling code: try-catch-throw, Multiple
Exceptions.

UNIT-V
Scripting Languages Overview of Scripting Languages – PERL, CGI, VB Script, Java Script.
PERL: Operators, Statements Pattern Matching etc. Data Structures, Modules, Objects, Tied
Variables, Inter process Communication Threads, Compilation & Line Interfacing.

TEXTBOOKS:

REFERENCES:
   Sons, 2005
UNIT - I
Supervised Learning (Regression/Classification)
Basic methods: Distance-based methods, Nearest-Neighbors, Decision Trees, Naive Bayes Linear models: Linear Regression, Logistic Regression, Generalized Linear Models Support Vector Machines, Nonlinearity and Kernel Methods
Beyond Binary Classification: Multi-class/Structured Outputs, Ranking

UNIT-II
Unsupervised Learning
Clustering: K-means/Kernel K-means
Dimensionality Reduction: PCA and kernel PCA
Matrix Factorization and Matrix Completion
Generative Models (mixture models and latent factor models)

UNIT-III
Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests)

UNIT-IV
Biological foundations to intelligent Systems: Artificial Neural Networks.
Single layer and Multilayer Feed Forward NN, LMS and Back Propagation. Algorithm, Feedback networks and Radial Basis Function Networks

UNIT-V
Fuzzy Logic, Knowledge Representation and Inference Mechanism, Defuzzification Methods Fuzzy Neural Networks and some algorithms to learn the parameters of the network like GA

TEXTBOOKS:
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)
5. Simon Haykins, “Neural Networks”, Prentice Hall
Course Outcomes: At the end of this course, students will be able to
1. Study the image formation models and feature extraction for computer vision
2. Identify the segmentation and motion detection and estimation techniques
3. Develop small applications and detect the objects in various applications

UNIT-I
Image Formation Models: Monocular imaging system • Orthographic & Perspective Projection • Camera model and Camera calibration • Binocular imaging systems, Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration. Apparel, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration. Apparel, Stereo vision

UNIT-II
Feature Extraction: Image representations (continuous and discrete) • Edge detection, Edge linking, corner detection, texture, binary shape analysis, boundary pattern analysis, circle and ellipse detection, Light at Surfaces; Phong Model; Reflectance Map; Albedo estimation; Photometric Stereo; Use of Surface Smoothness Constraint; Shape from Texture, color, motion and edges.

UNIT-III
Shape Representation and Segmentation: Deformable curves and surfaces • Snakes and active contours Level set representations • Fourier and wavelet descriptors • Medial representations • Multi-resolution analysis, Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation

UNIT-IV
Motion Detection and Estimation: Regularization theory • Optical computation • Stereo Vision Motion estimation, Background Subtraction and Modelling, Optical Flow, KLT, Spatio- Temporal Analysis, Dynamic Stereo; Motion parameter estimation • Structure from motion, Motion Tracking in Video

UNIT-V
Object recognition • Hough transforms and other simple object recognition methods • Shape correspondence and shape matching • Principal component analysis • Shape priors for recognition

REFERENCES:

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

1. Select a particular serial bus suitable for a particular application.
2. Develop APIs for configuration, reading and writing data onto serial bus.
3. Design and develop peripherals that can be interfaced to desired serial bus.

UNIT-I
Serial Busses - Physical interface, Data and Control signals, features, limitations and applications of RS232, RS485, I²C, SPI

UNIT-II
CAN - Architecture, Data transmission, Layers, Frame formats, applications

UNIT-III
PCIe - Revisions, Configuration space, Hardware protocols, applications

UNIT-IV
USB - Transfer types, enumeration, Descriptor types and contents, Device driver

UNIT-V
Data Streaming Serial Communication Protocol - Serial Front Panel Data Port (SFPDP) using fiber optic and copper cable

TEXTBOOKS:
5. Serial Front Panel Draft Standard VITA 17.1 – 200x
Course Outcomes: At the end of this course, students will be able to
1. Identify limitations of different architectures of computer
2. Analysis quantitatively the performance parameters for different architectures
3. Investigate issues related to compilers and instruction set based on type of architectures.

UNIT-I
Overview of Parallel Processing and Pipelining, Performance analysis, Scalability, Principles and implementation of Pipelining, Classification of pipelining processors, Advanced pipelining techniques, Software pipelining

UNIT-II
VLIW processors: Case study: Superscalar Architecture- Pentium, Intel Itanium Processor, Ultra SPARC, MIPS on FPGA, Vector and Array Processor, FFT Multiprocessor Architecture

UNIT-III
Multithreaded Architecture, Multithreaded processors, Latency hiding techniques, Principles of multithreading, Issues and solutions.  

UNIT-IV
Parallel Programming Techniques: Message passing program development, Synchronous and asynchronous message passing, Shared Memory Programming, Data Parallel Programming, Parallel Software Issues

UNIT-V
Operating systems for multiprocessors systems Customizing applications on parallel processing platforms

TEXTBOOKS:

REFERENCES:
1. V. Rajaraman, L. Sivaram Murthy, “Parallel Computers”, PHI.
UNIT- I
Instruction set principles and examples- Introduction, classifying instruction set- memory addressing-type and size of operands, operations in the instruction set.

UNIT – II
Pipelines: Introduction, basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe line for RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties.

UNIT - III
Instruction Level Parallelism the Hardware Approach: Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo’s approach, Branch prediction, high performance instruction delivery- hardware based speculation.
ILP Software Approach: Basic compiler level techniques, static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues -Hardware verses Software.

UNIT – IV
Multi Processors and Thread Level Parallelism: Multi Processors and Thread level Parallelism- Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – memory architecture, Synchronization.

UNIT – V
Inter Connection and Networks: Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters.
Intel Architecture: Intel IA- 64 ILP in embedded and mobile markets Fallacies and pit falls

TEXT BOOK:

REFERENCE BOOKS
Course Outcomes: At the end of the laboratory work, students will be able to:
1. Install, configure and utilize tool sets for developing applications based on ARM processor core SoC and DSP processor.
2. Develop prototype codes using commonly available on and off chip peripherals on the Cortex M3 and DSP development boards.

List of Assignments:

Part A) Experiments to be carried out on Cortex-M3 development boards and using GNU tool chain
1. Blink an LED with software delay, delay generated using the SysTick timer.
2. System clock real time alteration using the PLL modules.
3. Control intensity of an LED using PWM implemented in software and hardware.
4. Control an LED using switch by polling method, by interrupt method and flash the LED once every five switch presses.
5. UART Echo Test.
6. Take analog readings on rotation of rotary potentiometer connected to an ADC channel.
7. Temperature indication on an RGB LED.
8. Mimic light intensity sensed by the light sensor by varying the blinking rate of an LED.
9. Evaluate the various sleep modes by putting core in sleep and deep sleep modes.
10. System reset using watchdog timer in case something goes wrong.
11. Sample sound using a microphone and display sound levels on LEDs.

Part B) Experiments to be carried out on DSP C6713 evaluation kits and using Code Composer Studio (CCS)
12. To develop an assembly code and C code to compute Euclidian distance between any two points
13. To develop assembly code and study the impact of parallel, serial and mixed execution
14. To develop assembly and C code for implementation of convolution operation
15. To design and implement filters in C to enhance the features of given input sequence/signal
List of Experiments:

1. **Functional Testing Of Devices:** Flashing the OS on to the device into a stable functional state by porting desktop environment with necessary packages.

2. **Exporting Display On To Other Systems:** Making use of available laptop/desktop displays as a display for the device using SSH client & X11 display server.

3. **GPIO Programming:** Programming of available GPIO pins of the corresponding device using native programming language. Interfacing of I/O devices like LED/Switch etc., and testing the functionality.

4. **Interfacing Chronos eZ430:** Chronos device is a programmable texas instruments watch which can be used for multiple purposes like PPT control, Mouse operations etc., Exploit the features of the device by interfacing with devices.

5. **ON/OFF Control Based On Light Intensity:** Using the light sensors, monitor the surrounding light intensity & automatically turn ON/OFF the high intensity LED’s by taking some pre-defined threshold light intensity value.

6. **Battery Voltage Range Indicator:** Monitor the voltage level of the battery and indicating the same using multiple LED’s (for ex: for 3V battery and 3 led's, turn on 3 led's for 2-3V, 2 led's for 1-2V, 1 led for 0.1-1V & turn off all for 0V)

7. **Dice Game Simulation:** Instead of using the conventional dice, generate a random value similar to dice value and display the same using a 16X2 LCD. A possible extension could be to provide the user with option of selecting single or double dice game.

8. **Displaying RSS News Feed On Display Interface:** Displaying the RSS news feed headlines on a LCD display connected to device. This can be adapted to other websites like twitter or other information websites. Python can be used to acquire data from the internet.

9. **Porting Openwrt To the Device:** Attempt to use the device while connecting to a wifi network using a USB dongle and at the same time providing a wireless access point to the dongle.

10. **Hosting a website on Board:** Building and hosting a simple website(static/dynamic) on the device and make it accessible online. There is a need to install server (eg: Apache) and thereby host the website.

11. **Webcam Server:** Interfacing the regular usb webcam with the device and turn it into fully functional IP webcam & test the functionality.

12. **FM Transmission:** Transforming the device into a regular fm transmitter capable of transmitting audio at desired frequency (generally 88-108 Mhz)

Note: Devices mentioned in the above lists include Arduino, Raspberry Pi, Beaglebone
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH.- I YEAR- I SEMESTER
EMBEDDED SYSTEMS

RESEARCH METHODOLOGY AND IPR

Prerequisite: None

Course Objectives:
- To understand the research problem
- To know the literature studies, plagiarism and ethics
- To get the knowledge about technical writing
- To analyze the nature of intellectual property rights and new developments
- To know the patent rights

Course Outcomes: At the end of this course, students will be able to
- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today’s world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT-I:
Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT-II:
Effective literature studies approaches, analysis, Plagiarism, Research ethics

UNIT-III:
Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT-IV:

UNIT-V:

TEXT BOOKS:
2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”

REFERENCES:
ENGLISH FOR RESEARCH PAPER WRITING (Audit Course - I & II)

Prerequisite: None

Course objectives: Students will 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

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

UNIT-II:

UNIT-III:
Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT-IV:
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,

UNIT-V:
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. useful phrases, how to ensure paper is as good as it could possibly be the first-time submission

TEXT BOOKS/ REFERENCES:
Prerequisite: None

Course Objectives: Students will be able to

- learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- critically 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.
- critically 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.

UNIT-I:
Introduction:
Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.
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.

UNIT-II:
Repercussions of Disasters and Hazards:

UNIT-III:
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.

UNIT-IV:
Risk Assessment Disaster Risk:

UNIT-V:
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.
TEXT BOOKS/ REFERENCES:
2. Sahni, Pardeep Et. Al. (Eds.),” Disaster Mitigation Experiences and Reflections”, Prentice Hall of India, New Delhi.
JAWAHRLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (EMBEDDED SYSTEMS)

SANSKRIT FOR TECHNICAL KNOWLEDGE (Audit Course - I & II)

Prerequisite: None

Course Objectives:
- 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: 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

UNIT-I:
Alphabets in Sanskrit,

UNIT-II:
Past/Present/Future Tense, Simple Sentences

UNIT-III:
Order, Introduction of roots,

UNIT-IV:
Technical information about Sanskrit Literature

UNIT-V:
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

TEXT BOOKS/ REFERENCES:
1. “Abhyaspustakam” – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi
2. “Teach Yourself Sanskrit” Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthamam, New Delhi Publication
Prerequisite: None

Course Objectives: Students will be able to
- Understand value of education and self-development
- Imbibe good values in students
- Let the should know about the importance of character

Course outcomes: Students will be able to
- Knowledge of self-development
- Learn the importance of Human values
- Developing the overall personality

UNIT-I:

UNIT-II:

UNIT-III:
Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline, Punctuality, Love and Kindness.

UNIT-IV:

UNIT-V:

TEXT BOOKS/ REFERENCES:
CONSTITUTION OF INDIA (Audit Course - I & II)

Prerequisite: None

Course Objectives: 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.

UNIT-I:

UNIT-II:

UNIT-III:
Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualification, Powers and Functions.

UNIT-IV:

UNIT-V:
TEXT BOOKS/ REFERENCES:
1. The Constitution of India, 1950 (Bare Act), Government Publication.
Prerequisite: None

Course Objectives: Students will be able to:
- Review existing evidence on the review topic to inform programme 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?

UNIT-I:

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

UNIT-III:

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

UNIT-V:
Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

TEXT BOOKS/ REFERENCES:


STRESS MANAGEMENT BY YOGA (Audit Course - I & II)

Prerequisite: None

Course Objectives:
- To achieve overall health of body and mind
- To overcome stress

Course Outcomes: Students will be able to:
- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency

UNIT-I:
Definitions of Eight parts of yog. (Ashtanga)

UNIT-II:
Yam and Niyam.

UNIT-III:
Do’s and Don’t’s in life.
i) Ahinsa, satya, astheya, bramhacharya and aparigraha
ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT-IV:
Asan and Pranayam

UNIT-V:
i) Various yog poses and their benefits for mind & body
ii) Regularization of breathing techniques and its effects-Types of pranayam

TEXT BOOKS/ REFERENCES:
1. “Yogic Asanas for Group Tarining-Part-I”: Janardan Swami Yogabhayasi Mandal, Nagpur
2. “Rajayoga or conquering the Internal Nature” by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata
PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS
(Audit Course - I & II)

Prerequisite: None

Course Objectives:
- 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: 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

UNIT-I:
Neetisatakam-Holistic development of personality
- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride & heroism)
- Verses- 26,28,63,65 (virtue)

UNIT-II:
Neetisatakam-Holistic development of personality
- Verses- 52,53,59 (don’ts)
- Verses- 71,73,75,78 (do’s)

UNIT-III:
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-IV:
Statements of basic knowledge.
- Shrimad Bhagwad Geeta: Chapter 2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad Bhagwad Geeta:

UNIT-V:
- Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
- Chapter 4-Verses 18, 38,39
- Chapter 18 – Verses 37,38,63

TEXT BOOKS/REFERENCES:
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.