

E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai
Accredited by NAAC with „A“ Grade | Accredited by NBA (CSE, EEE, MECH)
NAGAPATTINAM – 611 002



B.TECH. COMPUTER SCIENCE AND BUSINESS SYSTEMS

Full Time Curriculum and Syllabus

Second Year – Forth Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1902BS401	Operating Systems	3	0	2	4	50	50	100
1902BS402	Database Management Systems	3	0	0	3	40	60	100
1902BS403	Software Design with UML	3	0	2	4	50	50	100
1902BS404	Marketing Research and Marketing Management	3	0	0	3	40	60	100
1901GE401	Introduction to Innovation, IP Management and Entrepreneurship	3	0	0	3	40	60	100
1901MA404	Operations Research	3	0	0	3	40	60	100
Laboratory Course								
1902BS451	Database Management Systems Lab	0	0	2	1	50	50	100
1901EN401	Business Communication and Value Science – III	1	0	4	3	50	50	100
1904GE451	Life Skills: Verbal Ability	0	0	2	1	100	-	100
Audit Course								
1901MCX01	Environmental Studies	3	0	0	0	100	-	100

L – Lecture | T – Tutorial | P – Practical | C – Credit | CA – Continuous Assessment | ES – End Semester

1902BS401

OPERATING SYSTEMS

L	T	P	C
3	0	2	4

MODULE I INTRODUCTION

9 Hours

Concept of Operating Systems (OS), Generations of OS, Types of OS, OS Services, Interrupt handling and System Calls, Basic architectural concepts of an OS, Concept of Virtual Machine, Resource Manager view, process view and hierarchical view of an OS.

MODULE II PROCESS MANAGEMENT SYSTEM

9 Hours

Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching, Threads: Definition, Various states, Benefits of threads, Types of threads, Concept of multi-threads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time, Scheduling algorithms: Pre-emptive and non-pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

MODULE III IPC AND DEADLOCKS

9 Hours

Concurrent processes, precedence graphs, Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Semaphores, Strict Alternation, Peterson's Solution, The Producer/ Consumer Problem, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem, Barber's shop problem, Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery, Concurrent Programming: Critical region, conditional critical region, monitors, concurrent languages, communicating sequential process (CSP); Deadlocks - prevention, avoidance, detection and recovery.

MODULE IV MEMORY MANAGEMENT SYSTEM

9 Hours

Memory Management: Basic concept, Logical and Physical address maps, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction, Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page allocation, Partitioning, Paging, Page fault, Working Set, Segmentation, Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU), I/O Hardware: I/O devices, Device controllers, Direct Memory Access, Principles of I/O.

MODULE V FILE AND DISK MANagementsystem

9Hours

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance, Disk Management: Disk structure, Disk scheduling- FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.

TOTAL: 45 HOURS

LIST OF EXPERIMENTS:

1. Analysis and Synthesis of Basic Linux Commands
2. Programs using Shell Programming
3. Implementation of Unix System Calls
4. Simulation and Analysis of Non pre-emptive and Pre-emptive CPU Scheduling Algorithms
5. Simulation of Producer – Consumer Problem using Semaphores and Implementation of Dining Philosopher's Problem to demonstrate Process Synchronization
6. Simulation of Banker's Algorithm for Deadlock Avoidance
7. Analysis and Simulation of Memory Allocation and Management Techniques
8. Implementation of Page Replacement Techniques
9. Simulation of Disk Scheduling Algorithms

10. Implementation of File organization Techniques.

TOTAL: 30 HOURS

COURSE OUTCOMES:

On the Successful completion of the course, Students will be able to

- CO1: Infer the knowledge on evolution of operating systems from primitive batch systems to sophisticated multi-user systems and implement the usage of different system calls to manage the resources.
- CO2: Analyze the mechanism of threads with the process of scheduling algorithms used in a Multi-programming environment.
- CO3: Outline the mechanism of inter process communication using shared memory, message passing and analyze the activities of process synchronization, deadlock to increase the system performance.
- CO4: Design the hardware component to implement the virtual memory environment with the base knowledge of memory management methodologies.
- CO5: Prefer a most suitable file system and the ordered perspective module of disk management methods for computing and storage scenario.

REFERENCES:

1. Operating System Concepts Essentials. Abraham Silber schatz, Peter Baer Galvin and Greg Gagne.
2. Operating Systems: Internals and Design Principles. William Stallings.
3. Operating System: A Design-oriented Approach. Charles Patrick Crowley.
4. Operating Systems: A Modern Perspective. Gary J. Nutt.
5. Design of the Unix Operating Systems. Maurice J. Bach.
6. Understanding the Linux Kernel, Daniel Pierre Bovet, Marco Cesati.
7. Charles Patrick Crowley, “Operating System: A Design-oriented Approach”, 2001.
8. Daniel Pierre Bovet, Marco Cesati, “Understanding the Linux Kernel”, 2000.

1902BS402	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3
MODULE I	DATABASE ARCHITECTURE AND DATA MODEL				9 Hours
Introduction to Database-Hierarchical, Network and Relational Models. Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language(DML) Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations					
MODULE II	RELATIONAL QUERY AND DATABASE DESIGN				12 Hours
Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Functional Dependencies, Normal forms, Dependency preservation, Lossless design					
MODULE III	QUERY PROCESSING AND STORAGE				8 Hours
Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms. Storage strategies: Indices, B-trees, Hashing					
MODULE IV	TRANSACTION PROCESSING				8 Hours
Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp-based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery					
MODULE V	DATABASE SECURITY				7 Hours
Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.					
					TOTAL: 45 HOURS

FOR FURTHER READING:

Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining

REFERENCES:

1. Database System Concepts. Abraham Silberschatz, Henry F. Korth and S. Sudarshan.
2. Principles of Database and Knowledge – Base Systems, Vol. 1 by J. D. Ullman.
3. Fundamentals of Database Systems. R. Elmasri and S. Navathe.
4. Foundations of Databases. Serge Abiteboul, Richard Hull, Victor Vianu.

1902BS403	SOFTWARE DESIGN WITH UML	L	T	P	C
		3	0	2	4
MODULE I	INTRODUCTION TO ON OBJECT ORIENTED TECHNOLOGIES AND THE UML METHOD				9 Hours
	Software development process: The Waterfall Models. The Spiral Model-The Software Crisis- description of the real world using the Objects Model- Classes, inheritance and multiple - configurations-Quality software characteristics- Description of the Object Oriented Analysis process vs. the Structure Analysis Model.				
MODULE II	INTRODUCTION TO THE UML LANGUAGE				9 Hours
	Standards-Element s of the language- General description of various models-The process of Object Oriented software development - Description of Design Patterns - Technological Description of Distributed Systems.				
MODULE III	REQUIREMENTS ANALYSIS USING CASE MODELING				9 Hours
	Analysis of system requirements - Actor definitions - Writing a case goal - Use Case Diagrams - Use Case Relationships.				
MODULE IV	TRANSFER FROM ANALYSIS TO DESIGN IN THE CHARACTERIZATION STAGE INTERACTION DIAGRAMS.				9 Hours
	Description of goal-Defining UML Method, Operation, Object Interface, Class-Sequence Diagram- Finding objects from Flow of Events-Describing the process of finding objects using a Sequence Diagram- Describing the process of finding objects using a Collaboration Diagram.				
MODULE V	THE LOGICAL VIEW DESIGN STAGE: THE STATIC STRUCTURE DIAGRAMS.				9 Hours
	The Class Diagram Model- Attributes descriptions- Operations descriptions-Connections descriptions in the Static Model -Association, Generalization, Aggregation, Dependency, Interfacing, Multiplicity.				

TOTAL: 45 HOURS

LIST OF EXPERIMENTS:

Consider the following applications to implement the below mentioned models.

1. Student Marks Analyzing System
2. Online Quiz System
3. Online Railway Ticket Reservation Systems
4. Payroll Processing System
5. Course Registration System
6. Expert System for Medical Diagnosis System
7. ATM Systems
8. Stock Maintenance
9. Library Management System
10. Passport Automation System

EXPERIMENT 1

Implement Package Diagram Model.

- Description of the model.
- White box, black box.
- Connections between packagers.
- Interfaces.
- Create Package Diagram.
- Drill Down.

EXPERIMENT 2

Implement Dynamic Model: State Diagram.

- Description of the State Diagram.
- Events Handling.
- Description of the Activity Diagram.

- Exercise in State Machines.

EXPERIMENT 3

Implement Dynamic Model: Activity Diagram.

- Description of the State Diagram.
- Events Handling.
- Description of the Activity Diagram.
- Exercise in State Machines.

EXPERIMENT 4

Component Diagram Model.

- Physical Aspect.
- Logical Aspect.
- Connections and Dependencies.
- User face.
- Initial DB design in a UML environment.

EXPERIMENT 5

Deployment Model.

- Processors.
- Connections.
- Components.
- Tasks.
- Threads.
- Signals and Events.

COURSE OUTCOMES:

On the Successful completion of the course, Students will be able to

CO1: Analyze and identify a suitable software development life cycle model for an application.

CO2: Exemplify the concept of object oriented software development with UML.

CO3: Design use case relationships with requirements analysis.

CO4: Design the Object Oriented Methodologies with interaction diagrams.

CO5: Develop the view layer classes and its relationships.

REFERENCES:

1. Object-Oriented Software Engineering: using UML, Patterns, and Java. Bernd Bruegge and Allen H.Dutoit.
2. Design Patterns: Elements of Reusable Object-Oriented Software. Erich Gamma, Richard Helm, Ralph Johnson, and John M.Vlissides

1902BS404	MARKETING RESEARCH AND MARKETING MANAGEMENT	L	T	P	C	
		3	0	0	3	
MODULE I	INTRODUCTION					10 Hours
Marketing Concepts and Applications: Introduction to Marketing & Core Concepts, Marketing of Services, Importance of marketing in service sector-Marketing Planning & Environment: Elements of Marketing Mix, Analyzing needs & trends in Environment -Macro, Economic, Political, Technical & Social- Understanding the consumer: Determinants of consumer behavior, Factors influencing consumer behavior –Market Segmentation: Meaning & Concept, Basis of segmentation, selection of segments, Market Segmentation strategies, Target Marketing, Product Positioning.						
MODULE II	MARKETING MIX					9 Hours
Concept, elements, 7 Ps of marketing-Product Management: Product decision and strategies, Packaging, Product Life cycle concept, New Product development & strategy, Stages in New Product development, Branding						
MODULE III	PRICING, PROMOTION AND DISTRIBUTION STRATEGY					10 Hours
Pricing Policies & Practices – Pricing Methods & Price determination Policies. Marketing Communication –The promotion mix, Advertising & Publicity, 5 M’s of Advertising Management, Personal selling, Public Relations. Marketing Channels, Retailing, Logistics & Supply Chain. Marketing Communication, Advertising						
MODULE IV	MARKETING RESEARCH					10 Hours
Introduction, Scope, Objectives & Limitations, Types of Market Research, Marketing Research Techniques, Survey Questionnaire design & drafting, Pricing Research, Media Research, Qualitative Research, Data Analysis: Use of various statistical tools – Descriptive & Inference Statistics, Statistical Hypothesis Testing, Multivariate Analysis –Discriminate Analysis, Cluster Analysis, Segmenting, Factor Analysis						
MODULE V	INTERNET MARKETING					6 Hours
Introduction to Internet Marketing. Mapping fundamental concepts of Marketing (7Ps, STP); Strategy and Planning for Internet Marketing.						
						TOTAL: 45 HOURS

FURTHER READING:

Business to Business Marketing: Fundamental of business markets. Organizational buying process. Business buyer needs. Market and sales potential. Business to Business marketing strategy Product in business markets. Price in business markets. Place in business markets. Promotion in business markets. Relationship, networks and customer relationship management.

REFERENCES:

1. Rajan Saxena, “Marketing Management” ,McGraw Hill Education, 6th edition, 2019
2. S.A.Sherlekar, “Marketing Management”, Himalaya Publishing House, 2014
3. Service Marketing– S.M. Zha
4. Journals–The IUP Journal of Marketing Management, Harvard Business Review
5. Research for Marketing Decisions by Paul Green, Donald, Tull
6. Business Statistics, A First Course, David M. Levine et al., Pearson Publication
7. Marketing Management (Analysis, Planning, Implementation & Control)–Philip Kotler

1901GE401	INTRODUCTION TO INNOVATION, IP MANAGEMENT AND ENTREPRENEURSHIP	L	T	P	C	
		3	0	0	3	
MODULE I	INNOVATION: WHAT AND WHY?					9 Hours
Innovation as a core business process, Sources of innovation, Knowledge push vs. need pull innovations. Class Discussion-Is innovation manageable or just a random gambling activity?						
MODULE II	BUILDING AN INNOVATIVE ORGANIZATION					9 Hours
Creating new products and services, Exploiting open innovation and collaboration, Use of innovation for starting a new venture .Class Discussion- Innovation: Co-operating across networks vs. „go-it-alone“ approach.						
MODULE III	ENTREPRENEURSHIP					9 Hours
Opportunity recognition and entry strategies – Entrepreneurship as a Style of Management-Maintaining Competitive Advantage-Use of IPR to protect Innovation.						
MODULE IV	ENTREPRENEURSHIP- FINANCIAL PLANNING					7 Hours
Financial Projections and Valuation- Stages of financing -Debt, Venture Capital and other forms of Financing.						
MODULE V	INTELLECTUAL PROPERTY RIGHTS (IPR)					11 Hours
Introduction and the economics behind development of IPR: Business Perspective-IPR in India – Genesis and Development-International Context-Concept of IP Management, Use in marketing. Types of Intellectual Property: Patent-Procedure, Licensing and Assignment, Infringement and Penalty-Trademark-Use in marketing, example of trademarks- Domain name -Geographical Indications- What is GI, Why protect them? -Copyright- What is copyright -Industrial Designs- What is design? How to protect? Class Discussion-Major Court battles regarding violation of patents between corporate companies						
						TOTAL: 45 HOURS

REFERENCES:

1. JoeTidd,JohnBessant.ManagingInnovation:IntegratingTechnological,MarketandOrganizational Change
2. Case Study Materials: To be distributed for class discussion

1901MA404

OPERATIONS RESEARCH

L T P C
3 0 0 3

MODULE I LINEAR PROGRAMMING

9 Hours

Linear programming – Examples from industrial cases, formulation & definitions, Matrix form. Basic concepts, Special cases – infeasibility, unboundedness, redundancy and degeneracy, Sensitivity analysis. Simplex Algorithm–slack, surplus & artificial variables, computational details, big-M method, identification and resolution of special cases through simplex iterations. Duality – formulation, results, fundamental theorem of duality, dual-simplex and primal-dual algorithms.

MODULE II TRANSPORTATION AND ASSIGNMENT PROBLEMS

9 Hours

TP - Examples, Definitions – decision variables, supply & demand constraints, formulation, Balanced & unbalanced situations, Solution methods – NWCR, minimum cost and VAM, test for optimality (MODI method), degeneracy and its resolution. AP-Examples, Definitions–decision variables, constraints formulation, Balanced & unbalanced situations, Solution method–Hungarian, test for optimality (MODI method), degeneracy & its resolution.

MODULE III PERT – CPM AND INVENTORY CONTROL

9 Hours

Project definition, Project scheduling techniques – Gantt chart, PERT & CPM, Determination of critical paths, Estimation of Project time and its variance in PERT using statistical principles, Concept of project crashing/time-cost trade-off Inventory Control: Functions of inventory and its disadvantages, ABC analysis, Concept of inventory costs, Basics of inventory policy (order, lead time, types), Fixed order-quantity models–EOQ, POQ & Quantity discount models. EOQ models for discrete MODULES, sensitivity analysis and Robustness.

MODULE IV QUEUING THEORY

9 Hours

Definitions– queue (waiting line), waiting costs, characteristics (arrival, queue, service discipline) of queuing system, queue types (channel vs. phase). Kendall’s notation, Little’s law, steady state behavior, Poisson’s Process & queue, Models with examples - M/M/1 and its performance measures; M/M/m and its performance measures.

MODULE V SIMULATION METHODOLOGY

9 Hours

Definition and steps of simulation, random number, random number generator, Discrete Event System Simulation–clock, event list, Application in Scheduling, Queuing systems and Inventory systems.

TOTAL: 45 HOURS

REFERENCES:

1. Operations Research: An Introduction. H.A. Taha.
2. Linear Programming. K. G. Murthy.
3. Linear Programming. G. Hadley.
4. Principles of OR with Application to Managerial Decisions. H.M. Wagner.
5. Introduction to Operations Research. F.S. Hiller and G.J. Lieberman.
6. Elements of Queuing Theory. Thomas L. Saaty.
7. Operations Research and Management Science, Hand Book: Edited By A. Ravi Ravindran.
8. Management Guide to PERT/CPM Wiest & Levy.

1902BS451

DATABASE MANAGEMENT SYSTEMS LAB

L	T	P	C
0	0	2	1

LIST OF EXPERIMENTS:

EXPERIMENT 1

Working with SQL commands like DDL, DML, TCL, and DCL.

EXPERIMENT 2

Execute simple queries using joins and Integrity constraints.

EXPERIMENT 3

Create database relation and check for normal forms.

EXPERIMENT 4

Implement Cursor and trigger in PL/SQL block.

EXPERIMENT 5

Write PL/SQL block Programs using exception handling

EXPERIMENT 6

Design a PL/SQL blocks using subprograms namely functions and procedures

TOTAL: 30 HOURS

COURSE OUTCOMES:

- CO1: Understand the architecture of database and the models for designing database.
- CO2: Develop solutions to a broad range of query and remove the anomalies using normalization.
- CO3: Understand database query processing and storage strategies.
- CO4: Analyze the basic issues of transaction processing, concurrency control and recovery
- CO5: Outline the concept of database security.

REFERENCES:

1. Database System Concepts. Abraham Silber schatz, Henry F. Korth and S. Sudarshan.
2. Principles of Database and Knowledge – Base Systems, Vol 1 by J. D. Ullman.
3. Fundamentals of Database Systems. R. Elmasri and S. Navathe.
4. Foundations of Databases. Serge Abiteboul, Richard Hull, Victor Vianu.

1904GE451	LIFE SKILLS: VERBAL ABILITY	L	T	P	C
		0	0	2	1
MODULE I	VOCABULARY USAGE				6 Hours
Introduction - Synonyms and Antonyms based on Technical terms – Single word Substitution – Newspaper, Audio and video listening activity.					
MODULE II	COMPREHENSION ABILITY				6 Hours
Skimming and Scanning – Social Science passages – Business and Economics passages – latest political and current event based passages – Theme detection – Deriving conclusion from passages.					
MODULE III	BASIC GRAMMAR AND ERROR DETECTION				6 Hours
Parallelism – Redundancy – Ambiguity – Concord - Common Errors – Spotting Errors – Sentence improvement – Error Detection FAQ in Competitive exams.					
MODULE IV	REARRANGEMENT AND GENERAL USAGE				6 Hours
Jumble Sentences – Cloze Test - Idioms and Phrases – Active and passive voice – Spelling test.					
MODULE V	APPLICATION OF VERBAL ABILITY				6 Hours
Business Writing - Business Vocabulary - Delivering Good / Bad News - Media Communication - Email Etiquette – Report Writing - Proposal writing – Essay writing– Indexing –Market surveying.					
					TOTAL: 30 HOURS

REFERENCES:

1. Arun Sharma and Meenakshi Upadhyav, How to Prepare for Verbal Ability and Reading Comprehension for CAT, McGrawHill Publication, Seventh Edition 2017s
2. R S Aggarwal and Vikas Aggarwal , Quick Learning Objective General English ,S.Chand Publishing House, 2017
3. Dr.K.Alex , Soft Skills, S.Chand Publishing House, Third Revise Edition, 2014

1901MCX01

ENVIRONMENTAL STUDIES

L T P C
3 0 0 0

MODULE I ECOSYSTEMS AND BIODIVERSITY

10 Hours

Concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers- Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Documentation of the medicinal plants in your native place

MODULE II NATURAL RESOURCES

10 Hours

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Documentation of the effect of modern Agriculture in your nearby Village

MODULE III ENVIRONMENTAL POLLUTION

9 Hours

Definition – Source, causes, effects and control measures of: (a) Air pollution - Mitigation procedures- Control of particulate and gaseous emission, Control of SOX, NOx, CO and HC) -Technology for capturing CO2 (metallo organic frame works) (b) Water pollution – Waste water treatment processes. (c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–role of an individual in prevention of pollution – pollution case studies. Documentation study of local polluted site – Urban / Rural / Industrial / Agricultural

MODULE IV SOCIAL ISSUES AND THE ENVIRONMENT

8 Hours

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management -environmental ethics: Issues and possible solutions – 12 Principles of green chemistry – consumerism and waste products – environment protection act – Air act – Water act – Wildlife protection act – Forest conservation act – The Biomedical Waste (Management and Handling) Rules; 1998 and amendments- scheme of labeling of environmentally friendly products (Ecomark) central and state pollution control boards- disaster management: floods, earthquake- Public awareness. Analyze the recent steps taken by government of India to prevent pollution (Green India and Clean India)

MODULE V HUMAN POPULATION AND THE ENVIRONMENT

8 Hours

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare –Environmental impact analysis (EIA) -GIS-remote sensing-role of information technology in environment and human health – Case studies. Documentation study of the Human health and the environment in nearby Hospital (Statistical report)

TOTAL: 45 HOURS

REFERENCES:

1. Trivedi.R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media, 3rd edition, BPB publications, 2010.
2. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, "Environmental law", Prentice hall of India PVT LTD, New Delhi,2007.
4. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.
5. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006
6. Ravikrishnan "Environmental Science and Engineering" Sri Krishna Hi-tech Publishing Company Pvt .