

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

## Scheme of Teaching and Examination

### B.E. VIII Semester Electronics & Telecommunication Engineering

Sl. No.	Board of Study	Code No.	Theory Subjects	Period Per Week			Scheme of Exam			Total Marks	Credit L+(T+P)/2
				L	T	P	Theory/ Practical				
							ESE	CT	TA		
1	Electronics & Telecom.	328811 (28)	Optical Communication	3	1	-	80	20	20	120	4
2	Electronics & Telecom.	328812 (28)	VLSI Design	3	1	-	80	20	20	120	4
3	Electronics & Telecom.	328813 (28)	Industrial & Power Electronics	3	1	-	80	20	20	120	4
4	Refer Table -3		Professional Elective - III	3	1	-	80	20	20	120	4
5	Refer Table -4		Open Elective - IV	3	1	-	80	20	20	120	4
6	Electronics & Telecom.	328821 (28)	Optical Communication Lab	-	-	4	40	-	20	60	2
7	Electronics & Telecom.	328822 (28)	VLSI Design Lab	-	-	4	40	-	20	60	2
8	Electronics & Telecom.	328823 (28)	Digital Circuit Simulation Laboratory	-	-	4	40	-	20	60	2
9	Electronics & Telecom.	328824 (28)	Major Project	-	-	5	100	-	80	180	3
10	Electronics & Telecom.	300825 (28)	Report Writing & Seminar	-	-	2	-	-	40	40	1
11			Library	-	-	1	-	-	-	-	-
<b>TOTAL</b>				<b>15</b>	<b>5</b>	<b>20</b>	<b>620</b>	<b>100</b>	<b>280</b>	<b>1000</b>	<b>30</b>

L-Lecture, T- Tutorial, P - Practical, ESE- End Semester Examination, CT - Class Test, TA - Teacher's Assessment

**Table -3**  
**Professional Elective - III**

**Telecommunication Group:**

Sl. No.	Board of Study	Code	Subject
1	Electronics & Telecom.	328871 (28)	Video Transmission & Reception
2	Electronics & Telecom.	328872 (28)	Radar Engineering & Navigational Aids
3	Electronics & Telecom.	328873 (28)	Information Theory & Coding

**Allied Group:**

Sl. No.	Board of Study	Code	Subject
1	Electronics & Telecom.	328874 (28)	DSP Processors & Applications
2	Electronics & Telecom.	328875 (28)	Micro-electronic Devices & VLSI Technology
3	Electronics & Telecom.	328876 (28)	Industrial Automation
4	Electronics & Telecom.	328877 (28)	Digital Image Processing

Note (1)- 1/4th of total strength of students subject to minimum of twenty students is required to offer an elective in the college in a particular academic session.

Note (2) - Choice of elective course once made for an examination cannot be changed in future examinations.

<b>Open Elective -4</b>			
<b>S.No.</b>	<b>Board of Studies</b>	<b>Code</b>	<b>Name of Subject</b>
1	Management	300881 (36)	Enterprise Resource Planning
2	Information Technology	300882 (33)	E-Commerce & strategic IT
3	Management	300883 (36)	Technology Management
4	Information Technology	300884 (33)	Decision Support & Executive Information system
5	Computer Science & Engg.	300885 (22)	Software Technology
6	Management	300886 (36)	Knowledge Entrepreneurship
7	Management	300887 (36)	Finance Management
8	Management	300888 (36)	Project Planning, Management & Evaluation
9	Mechanical Engg.	300889 (37)	Safety Engineering
10	Computer Science & Engg.	300890 (22)	Bio Informatics
11	Mechanical Engg.	300891 (37)	Energy Conservation & Management
12	Nanotechnology	300892 (47)	Nanotechnology
13	Management	300893 (36)	Intellectual Property Rights
14	Mechanical Engg.	300894 (37)	Value Engineering
15	Civil Engg.	300895 (20)	Disaster Management
16	Civil Engg.	300896 (20)	Construction Management
17	Civil Engg.	300897 (20)	Ecology and Sustainable Development
18	Chem. Engg.	300898 (19)	Non Conventional Energy Sources
19	Electrical Engg.	300899 (24)	Energy Auditing and Management

Note (1)- 1/4th of total strength of students subject to minimum of twenty students is required to offer an elective in the college in a particular academic session.

Note (2) - Choice of elective course once made for an examination cannot be changed in future examinations.

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester: VIII  
Subject: Industrial & Power Electronics  
Total Theory Periods: 40  
Total Marks in End Semester Examination: 80  
Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication  
Code: 328813 (28)  
Total Tutorial Periods: 12

## **UNIT – I**

**Regulated Power Supply:** Zener diode voltage regulator, Transistorized series voltage regulator, Op-amp voltage regulator *using IC 741*, Transistorized shunt voltage regulator, Three terminal voltage regulator *using LM-340*, Switch Mode Power Supply, Comparison of Linear Power supply and SMPS.

## **UNIT – II**

**Silicon Controlled Rectifiers:** General idea of thyristor family members. SCR- Construction, Principle of operation, *Dynamic & Gate* characteristics & SCR Terminologies, Different methods of turning on & turning off of SCRs (Load commutation; Forced commutation; External pulse commutation). Different methods of triggering SCR Circuits, Series & Parallel operation of SCRs.

## **UNIT – III**

### **Power Conditioning Circuits:**

**Inverters:** Line Commutated Inverters (*3 phase bridge inverter*), Forced Commutated Inverters (*McMurray Bridge inverter*)

**Dual Converters:** Phase controlled dual converter, Single-phase dual converter, Three phase dual converter, Circulating current type dual converter – Mid-point configuration & Dual bridge configuration. **Choppers:** Principle of operation, Chopper control technique, Voltage step-down & Step-up chopper, Jones Chopper.

**Cycloconverters:** Single phase/Single phase – Midpoint configuration & Bridge configuration, Three phase/Single phase cycloconverter: Types-Circulating current type, Non-circulating current type.

(Only Qualitative analysis are needed in this unit)

## **UNIT – IV**

### **Heating and Welding Control:**

**Induction heating:** Theory, Principle, Effects of supply frequency, and Choice of frequency, Applications.

**Dielectric heating:** Electronic theory, Principle, heating in materials of irregular shape, Limitations, Effect of variation of supply voltage & frequency, Applications.

**Welding:** Theory of Resistance welding, Classification of Resistance welding and Scheme for AC Resistance welding.

## **UNIT – V**

### **AC Power Conditioner:**

**Power supply Noise:** Origin, Effect on computer & Communication systems, Reduction of noise, Different forms of their noise (*thermal, shot, flicker & transit time noise*) & Requirements and characteristics of the computer power supply system, Types of power line disturbances, Effects of power line disturbances on sensitive electronic equipment.

**Servo System:** Servo motor, Servo-controlled voltage stabilizer:- Buck-Boost control, Constant voltage transformer,

UPS: On-line & Off-line.

### **Name of Text Books:**

1. Industrial Electronics & Control: B. Paul, PHI
2. Power Electronics: M. D. Singh, Khanchandani, TMH

### **Name of Reference Books:**

1. Industrial & Power Electronics: H.C. Rai, Umesh Publications.
2. Power Electronics: P.C. Sen, TMH

**The underlined portions have been elaborated.**

**This syllabus will be effective from the session Jan 2012.**

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester: VIII  
Subject: Optical Communication  
Total Theory Periods: 40  
Total Marks in End Semester Examination: 80  
Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication  
Code: 328811 (28)  
Total Tutorial Periods: 12

## **UNIT – I**

**Basic Optical Laws and definition:** Numerical Aperture; Optical Fiber Modes and propagation; Single Mode and Multi-Mode Fibers; Step Index and Graded Index Fibers Structures; Different types of attenuations in optical fiber communication; Fiber Optic Cable; Fabrication;

## **UNIT - II**

**Light sources:** Light Emitting diodes and types of LEDs; LASER principles; Laser diode and types of LDs; Operating characteristics and Modulation circuits of LED and LASER diodes.

## **UNIT – III**

**Optical Couplers and connectors:** Connector principles; fibre end preparation; splices; connectors; source coupling; Distribution system; Distribution networks; Directional couplers; Star couplers; Switches;

## **UNIT - IV**

**Light Detectors:** Principle of photo-detection; semiconductor photodiode; PIN photodiode; Avalanche photodiode; Noise and Detection; Thermal noise and Shot noise; signal to noise ratio;

## **UNIT - V**

**Optical Measurement & Networks:** Numerical Aperture; Attenuation and Dispersion measurement; Optical networks: Introduction to SONET/SDH; SONET/SDH Networks; formats and interface.

### **Names of Text Books:**

1. Optical Fiber Communication, Keiser, TMH
2. Fiber Optic Communications, Palais, 4<sup>th</sup> Ed., Pearson Education

### **Names of Reference Books:**

1. Opto Electronics and Fiber Optic Communication, Sarkar & Sarkar, New Age International Publishers.
2. Text Book on Optical Fiber Communication and its Applications, Gupta, PHI
3. Fundamentals of Optical Fiber Communication, Satish Kumar, PHI
4. Semiconductors Optoelectronic Devices, Bhattacharya, Pearson Education
5. Optical Fiber Communication-Principles and Practice, John Senior, PHI

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester: VIII  
Subject: VLSI Design  
Total Theory Periods: 40  
Total Marks in End Semester Examination: 80  
Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication  
Code: 328812 (28)  
Total Tutorial Periods: 12

## **UNIT – I**

**Introduction to Integrated Circuits:** Brief introduction of SSI, MSI and LSI; VLSI Design flow; Design hierarchy; concept of regularity, Modularity and Locality; **VLSI design styles with FPGA and CPLD:** FPGA and CPLD architecture, logic function implementation using LUT.

## **UNIT – II**

**Design Aspects:** Basic steps of fabrication process of PMOS, CMOS; Basic Bi-CMOS circuits (Inverter, NOR2, NAND2), **Layout design rules:** Basics of stick diagram for CMOS; CMOS lambda based layout design rules, Layout of CMOS inverter, NAND Gate, NOR Gate, Full Adder, calculation of resistance and capacitance.

## **UNIT – III**

**Lay Out Design:** Lay out design of Memories: 6-T SRAM cell, 1-T DRAM cell; 4x4 NAND and NOR based ROM array, **Combinational Logic:** 2:4 Decoder, 4:1 MUX, 1 bit Full Adder, Comparator; **Sequential Logic:** CMOS SR, JK and D latch.

## **UNIT – IV**

**Combinational Logic Design:** Static and Dynamic Power dissipation in CMOS Inverter; Introduction to CAD Tools; Introduction to VHDL and Verilog; **VHDL:** Operators, Data Types, Libraries; Entity, Architecture; Data flow, Structural and Behavioral programming, Generic, Signal, Generate, Process, Loops, Case, Variable, Procedure, Component and Configuration.

## **UNIT – V**

**Sequential Logic Design:** Sequential design by VHDL: Flip-Flop and Shift Registers; FSM: Moore and Mealy machine, Counter, Sequence Detector, Bus structure in VHDL, Test bench Modeling in VHDL, Basic concepts of operator overloading, Blocks, Delays, Concepts of Verifications for BIST using Half Adder.

Note: Unit 4 and Unit 5 is based on VHDL programming.

### **Recommended books:**

1. CMOS VLSI Design: A Circuits and Systems Perspective by Weste, Pearson Education Pub.
2. Basic VLSI Design by Pucknell & Esharghian, 3<sup>rd</sup> Ed., PHI Pub.
3. Fundamentals of Digital Logic with VHDL Design, Brown TMH, Pub.
4. VHDL Primer by J. Bhaskar, PHI

### **Reference Books:**

1. Modern VLSI Design - System-on-chip Design, Wolf, PHI pub.
2. Modern VLSI Design by Wolf, Pearson Education Pub.
3. VHDL Programming by Perry, TMH Pub
4. Verilog HDL by Palntikar, Pearson Education Pub.
5. Fundamentals of Digital Logic with Verilog Desgn, Brown TMH, Pub.
6. Verilog-HDL Primer by J. Bhaskar, PHI

**The underlined portions have been elaborated.**

**This syllabus will be effective from the session Jan 2012.**

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester : VIII  
Subject: Video Transmission and Reception  
Total Theory Periods: 40  
Total Marks in End Semester Examination: 80  
Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication  
Code: 328871 (28)  
Total Tutorial Periods: 12

## **UNIT – I**

**Television picture** , Introduction geometric form and aspect ratio; image continuity; number scanning lines; interlaced scanning ; **Composite video signal**, introduction; video signal dimension; horizontal sync composition; vertical sync detail; functions of vertical pulsed train; scanning sequence detail.

## **UNIT – II**

**Color signal generation:** Introduction; perception of brightness and colors; additive color mixing; video signal for color; luminance signal; compatibility; color difference signal; **Television signal transmission:** positive and negative modulation; VSB transmission; monochrome transmitter; Merits and demerits of the PAL system; SECAM system and NTSC system.

## **UNIT – III**

### **Television cameras:**

Basic principles, Image orthicon, Vidicon, Plumbicon, Solid-state image scanners; Silicon diode array vidicon, camera optics, color camera. **Picture tubes:** Colour television display tubes Delta-gun colour picture tube; Purity and convergence; Precision (PIL) colour picture tube; The deflection unit; Purity and static convergence adjustments; Dynamic convergence adjustments; Trinitron colour picture tube; Pincushion correction techniques. Automatic-degaussing (ADG) circuit. Grey scale tracking.

## **UNIT – IV**

**Advances in Television technology:** Video recorders, video disc, optical disc, capacitance disc; Cable Television: coaxial cable for CATV, characteristic impedance, cable losses, Two-way cable systems cable TV converter; Recent Technologies: HDTV, Flat panel display TV receivers; Colour receivers for the new generations.

## **UNIT-V**

**Multimedia Fundamentals:** Basic concepts of Computer-based Multimedia Different types of media Audio, Video, Text, Image, Graphics, and animation; Multimedia applications, Authoring Tools, Multimedia building blocks, video capturing and editing

### **Text Books:**

1. Monochrome and Colour Television: R. R. Gulati, Wiley Eastern.
2. Multimedia – An Introduction: John Villamil, Pearson - Prentice Hall

### **Reference Books:**

1. Modern Television Practice: R.R. Gulati, New Age International
2. Basic Television and Video System: Bernard Grob
3. Multimedia Computing communications & Applications, Ralf Steinmetz and Kerla Nashtedt, Pearson Education Pub.

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester : VIII  
Subject: Radar Engineering & Navigational Aids  
Total Theory Periods: 40  
Total Marks in End Semester Examination: 80  
Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication  
Code: 328872 (28)  
Total Tutorial Periods: 12

## **UNIT – I**

**Principles and Applications:** Basic Radar, Radar Block Diagram, Radar Frequencies, Applications of Radar, Radar Range Equation, Probabilities of Detection of False Alarm Integration of Radar Pulses, Radar Cross Section of Targets.

## **UNIT – II**

**MTI And Pulse Doppler Radar:** Introduction to Doppler and MTI Radar, delay line cancellers, staggered PRF. Range gated Doppler filter, limitations to MTI performance. Tracking with Radar, Monopulse Tracking, Conical Scan and Sequential Lobing, Limitations to Tracking Accuracy, Low Angle Tracking, Tracking in range, Comparison of Trackers.

## **UNIT – III**

**Propagation of Radar Waves:** Forward Scattering from a Flat Earth, Scattering from Round Earth's Surface, Atmospheric Refraction – Standard Propagation, Non-Standard Propagation, Diffraction, Attenuation by Atmospheric Gases, External or Environmental Noise, Other Propagation Effects.

## **UNIT – IV**

**Antennas for Detection of Radar Signals:** Parabolic antennas, introduction to phased array, cosecant squared antenna, radome.

## **UNIT – V**

**Radar Transmitter and Receiver:** Radar Receiver, Receiver Noise Figure, Superheterodyne Receiver, Duplexers and Receiver Protectors, Radar Displays, introduction to ECM and ECCM, Linear Beam Power Tubes, Solid State Power Sources, Magnetron.

### **Text Books:**

1. Introduction to Radar Systems by M.I Skolnik, TMH Pub. Co.
2. Microwave Radar and Navigational Aids by A.K. Sen and A.B. Bhattacharya, Khanna Publisher.

### **Reference Books:**

1. Radar: Principles, Technology, Applications by Edde, Pearson Education Pub.
2. Elements of Electronic Navigation by Nagaraj, TMH Pub.

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**Semester: VIII**

**Subject: Information Theory & Coding**

**Total Theory Periods: 40**

**Total Marks in End Semester Examination: 80**

**Minimum number of Class tests to be conducted: Two**

**Branch: Electronics & Telecommunication**

**Code: 328873 (28)**

**Total Tutorial Periods: 12**

## **UNIT-I**

**Uncertainty, Information and Entropy:** Entropy: information source and entropy, mutual information, information measures for continuous random variables Characteristics on information measure; Shannon's concept of information; Shannon's measure of information; Model for source coding theorem; Communication system; Source coding and line/channel coding; channel mutual information capacity (Bandwidth)

## **UNIT-II**

**Channel coding:** Theorem for discrete memory less channel, Information capacity theorem: Error detecting and error correcting codes; Types of codes; Block codes; Tree codes; Hamming and Lee Matrices; Description of linear block codes by matrices; Description of linear tree code by matrices; Parity check codes; Parity check polynomials;

## **UNIT-III**

**Compression:** Lossless and lossy ; Hoffmann codes; Binary Image compression schemes; Run –length Encoding; CCITT group-3 1D compression; CCITT group-3 2D compression; CCITT group-4 2D compression;

## **UNIT-IV**

**Video Image Compression:** Requirement of full motion video compression; CCITT H 261 video coding algorithm; MPEG compression methodology; MPEG-2 compression; Audio (Speech) compression;

## **UNIT-V**

**Cryptography:** Encryption; Decryption; Cryptogram (cipher text); Concept of cipher; Cryptoanalysis; Keys: Single key (Secret key); Cryptography; two-key (Public key) cryptography; Single key cryptography; Ciphers; Block Cipher code; Stream ciphers; Requirements for secrecy; The data Encryption Standard; Public Key Cryptography; Diffie-Hellmann public key distribution; The Rivest- Shamir Adelman(R-S-A) system for public key cryptography; Digital Signature;

### **Name of Text books:**

1. Digital Communication by Proakis, TMH (For Unit I & II)
2. Digital Image Processing by Gonzales & Woods, Pearson (for Unit – III & IV)
3. Local Area Network by G. Keiser, TMH (for Unit – V)

### **Name of Reference books:**

1. Digital Communication by Das, Mullick & Chatterjee, New Age Pub.
2. The Mathematics of Coding Theory, Garrett, Pearson Education
3. Norman Abramson, Information Theory, John Wiley
4. Shu Lin, Costello D.J., Error Control Coding - Fundamentals and Applications, Prentice Hall Inc. Englewood Cliffs
5. T. Cover and Thomas, Elements of Information Theory, John Wiley & Sons 1991.
6. R. Hill, A First Course in Coding Theory, Oxford University Press, 1986
7. M. Y. Rhee, Cryptography and Secure communication, McGraw-Hill, 1994
8. R. Bose, Information Theory, Coding and Cryptography, Tata McGraw-Hill, 2002



# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester : VIII  
Subject: DSP Processors and Applications  
Total Theory Periods: 40  
Total Marks in End Semester Examination: 80  
Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication  
Code: 328874 (28)  
Total Tutorial Periods: 12

## UNIT - I

**Instruction Set and Architecture of DSP Processor:** Computational characteristics of DSP algorithms and applications: their influence on defining a generic instruction-set architecture for DSPs.

## UNIT - II

**Architectural Requirement of DSPs:** High throughput, low cost, low power, small code size, embedded application techniques for enhancing computational throughput; parallelism and pipelining.

## UNIT - III

**Data-path of DSPs:** multiple on-chip memories and buses, dedicated address generator units, specialized processing units. Hardware multiplier, ALU, Shifter and on-chip peripherals for communication and control.

## UNIT - IV

**Control Unit of DSPs:** Pipelined instruction execution, specialized hardware for zero-overhead looping, Interrupts. Architecture of Texas instruments fixed-point and floating-point DSPs, Brief description of ADSP 218X/2106X DSPs, Programmer's model.

## UNIT - V

**Advanced DSPs:** TI's 320C6X, ADI's Tiger-SHARC, Lucent technologies' DSP 16000 VLIW processors. Applications: a few case studies of application of DSPs in Communication and Multimedia.

### Text Books:

1. Architecture for Digital Signal Processing, P. Pirsch, Jhon Wiley
2. Digital Signal Processors: Architectures, Implementations and Applications by Kuo, Pearson Education Pub.

### Reference Books:

1. Digital Signal Processing in VLSI, R.J. Higgins
2. Texas Instruments TMS320C5X, C54X and C6X Users manuals.
3. VLSI Digital Signal Processing Systems, K. Parthi, John Wiley
4. Digital Signal Processing for Multimedia Systems, K. Parthi and T. Nishitani, Marcel Dekker.
5. IEEE Signal Processing Magazine, Oct 86, Jan 89, July 97, Jan 98 and March 2000.

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester : VIII  
Subject: Microelectronic Devices & VLSI Technology  
Total Theory Periods: 40  
Total Marks in End Semester Examination: 80  
Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication  
Code: 328875 (28)  
Total Tutorial Periods: 12

## **UNIT – I**

**Introduction:** The Historical Prospect of Integrated Circuits, Silicon Wafers, Wafer Terminology.  
**Crystal Growth:** The Czochralski Technique, Bridgeman Technique, Float Zone Process.

## **UNIT – II**

**Oxidation:** Thermal Oxidation, Kinetics of Thermal Oxidation, Film Deposition, Dielectric Deposition, Polysilicon Deposition.

## **UNIT – III**

**Diffusion:** Diffusion Mechanics, Diffusion Equation, Diffusion Profile. **Ion Implantation:** Implantation Mechanism, Ion Implantation System, Low Energy Implantation, High Energy Implantation.

## **UNIT – IV**

**Epitaxy:** Vapour Phase Epitaxy, Liquid Phase Epitaxy, Molecular Beam Epitaxy. **Lithography:** Optical Lithography, Electron Beam Lithography, X-Ray Lithography, Ion Beam Lithography. **Etching:** Wet Chemical Etching, Reactive Chemical Etching. **Metallization:** Physical Vapour deposition, Chemical Vapour deposition, Aluminium Metallization, Metallization with Silicides. **Process Simulation and Integration**

## **UNIT – V**

**MOSFET Technology:** Introduction, MOS Structure. MOS Transistor: MOSFET Structure, Enhancement MOSFET, Threshold Voltage, Depletion MOSFET, Operation of MOSFET. MOSFET Characteristics: Gradual Channel Approximation, Charge Control Model, Velocity Saturation Effects, Channel Length Modulation, Subthreshold region. MOS Capacitance and Equivalent Circuit. Scaling of MOSFET: Short channel Effects, SPICE model for MOSFETs. MOSFET Fabrication.

### **Text Book:**

1. **VLSI Design** by Sujata Pandey & Manoj Pandey, Dhanpat Rai & co.
2. **VLSI Technology**, S.M. Sze, TMH Book Company

### **Reference Book:**

1. **VLSI Fabrication Principles** by Sorab K. Gandhi, Wiley & Sons, New York.
2. **Physics & Technology of Semiconductor Devices** by A.S. Grove, Wiley & Sons, New York.

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester : VIII

Subject: Industrial Automation

Total Theory Periods: 40

Total Marks in End Semester Examination: 80

Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication

Code: 328876 (28)

Total Tutorial Periods: 12

## **Unit – I**

**Introduction to process control:** Process Control Block Diagram, Control System Evaluation, Digital Control: Supervisory Control, Direct Digital Control, Networked Control Systems, Distributed Digital Control. Smart Sensor. Definitions of the terms used to describe process control. Data Acquisition Systems: DAS Hardware, DAS Software. Data Logger.

## **Unit – II**

**Controller Principles:** Process Characteristics: Process Equation, Process Load, Process Lag, Self-Regulation. Control System parameters: Error, Variable Range, Control parameter Range, Control Lag, Dead Time, Cycling, Controller Modes. Discontinuous Controller Mode: Two Position Mode, Multiposition Mode, Floating Control Mode. Continuous Control Mode: Proportional Control Mode, Integral Control Mode, Derivative Control Mode. Composite Control Modes: PI Control, PD Control, PID Control

## **Unit – III**

**Analog Controllers:** Introduction, Electronic Controllers: Error Detector, Single Controller Modes, Composite Controller Modes. Pneumatic Controllers: General features, Mode Implementation.

## **Unit – IV**

**Programmable Logic Controller:** Evaluation of PLC, PLC Architecture, Basic Structure. PLC Programming: Ladder Diagram – Ladder diagram symbols, Ladder diagram circuits. PLC Communications and Networking, PLC Selection: I/O quantity and Type, I/O Remoting requirements, Memory size and type, Programmer Units. PLC Installation, Advantages of using PLCs.

## **Unit – V**

**Distributed Control System:** Introduction, Overview of Distributed Control System, DCS Software configuration, DCS Communication, DCS Supervisory Computer Tasks, DCS Integration with PLCs and Computers, Features of DCS, Advantages of DCS.

### **Text Books:**

1. *Process Control Instrumentation Technology*, C.D. Johnson, PHI
2. *Computer Aided Process Control*, S.K. Singh, PHI

### **Reference Books:**

1. *Introduction to Instrumentation & Control*, A.K. Ghosh, Eastern Economy Edition
2. *Intelligent Instrumentation*, George C. Barney, Prentice Hall India

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester : VIII

Subject: Digital Image Processing

Total Theory Periods: 40

Total Marks in End Semester Examination: 80

Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication

Code: 328877 (28)

Total Tutorial Periods: 12

## **UNIT – I**

**Introduction:** Digital Image representation, Elements of Digital Image Processing Systems. Elements Of Visual perception structure of human eye, simple image model, sampling and quantization, basic relationship between pixels, imaging geometry, photographic film.

## **UNIT – II**

**Statistical properties:** Histogram mean, standard deviation, profile different distributions. **Image Transform:** One and two dimensional DFT the discrete cosine transform, Hadamand transform, haar transform, slant transform.

## **UNIT – III**

**Image Enhancement:** Spatial and frequency Domain methods point operations, contrast stretching, bit extraction, range compression, Histogram equalization, modification local enhancement, image smoothing spatial operations, filtering multispectral, color image processing, Pseudo- color image enhancement.

## **UNIT – IV**

Image restoration: degradation model, Restoration in spatial domain geometric transformation spatial transformation, approach to restoration, Inverse & Wiener filtering, **image compression:** basics of image compression, models, elements of information theory, error free compression, lossy compression, image segmentation, line detection, edge detection, edge linking and boundary detection, thresholding & region oriented segmentation.

## **UNIT – V**

**Image Analysis:** boundary extraction, boundary representation, region representation structure shape features, texture, scene matching and detection. **Application of image processing:** Character recognition, diagram understanding, medical imaging, scientific analysis, military guidance and reconnaissance remote sensing, telecommunication.

### **Name of Text Books:**

1. Digital Image Processing - Gonzawlez & Woods, Addison Wesley.
2. Digital Image Processing, Madhuri A. Joshi, PHI

### **Name of Reference Books:**

1. Digital Image Processing - Pratt, Wiley International.
2. Digital Image Processing – Said Ahmed, TMH.
3. Digital Image Processing & Analysis – B. Chanda & D. Dutta Majumdar. PHI

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester : VIII  
Subject: Optical Communication Lab  
Total Practical Periods: 50  
Total Marks in End Semester Examination: 40

Branch: Electronics & Telecommunication  
Code: 328821 (28)

## **Experiments to be performed:**

1. To measure bending loss of a fiber.
2. To propagation or attenuation loss in a fiber.
3. To obtain amplitude modulation and to transmit the same over fiber optic cable and to demodulate the same at the receiver end.
4. To determine the numerical aperture of a fiber.
5. To measure various types of losses occur in an optical fiber.
6. To study the AC characteristics of intensity modulation of laser and fiber optic system.
7. To measure optical power of a laser diode Vs. forward current.
8. To monitor photo diode current Vs. laser optical output.
9. Demonstration of voice transmission through optical fiber using FM.
10. Communication between two computers using RS232 interface via optical fiber.
11. To measure plastic fiber patch cord loss for various lengths of fiber.
12. To study voice transmission through fiber optic cable using PWM.
13. To transmit and receive text files over fiber optic cable.
14. To transmit, receive and observe digital signals over fiber optic cable.
15. To measure rise time, fall time, pulse width distortion of a laser and to determine transmission delay.

## **List of Equipments/Machine Required:**

Fiber optic trainer kit, optical fiber, Splicing unit, Data Acquisition card for optical signal, O/E & E/O Converter, CRO.

## **Recommended Books:**

1. Fundamentals of Optical Fiber Communication - Sathish Kumar, PHI

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester : VIII

Subject: VLSI Design Lab

Total Practical Periods: 50

Total Marks in End Semester Examination: 40

Branch: Electronics & Telecommunication

Code: 328822 (28)

## **Experiments to be performed:**

1. LAYOUT DESIGN OF CMOS INVERTER
2. LAYOUT DESIGN OF CMOS NAND GATE
3. LAYOUT DESIGN OF CMOS NOR GATE
4. LAYOUT DESIGN OF CMOS 2:1 MUX
5. LAYOUT DESIGN OF CMOS 1:2 DECODER
6. LAYOUT DESIGN OF ANY COMBINATIONAL LOGIC
7. LAYOUT DESIGN OF ANY SEQUENTIAL LOGIC
8. LAYOUT DESIGN OF CMOS MIXED DESIGN LOGIC
9. LAYOUT DESIGN OF CMOS COMPARATOR
10. DESIGN AND IMPLEMENTATION OF 4-BIT ADDER USING VHDL
11. DESIGN AND IMPLEMENTATION OF 8-BIT ADDER USING VHDL
12. DESIGN AND SIMULATION OF SEQUENTIAL CIRCUIT USING VHDL
13. DESIGN AND SIMULATION OF SEQUENTIAL CIRCUIT USING VERILOG
14. DESIGN AND SIMULATION OF FSM CIRCUIT USING VERILOG
15. DESIGN AND SIMULATION OF COUNTER USING VERILOG
16. DESIGN AND SIMULATION OF ARITHMETIC FUNCTION USING VERILOG
17. DESIGN AND SIMULATION OF BUSSES USING VHDL

## **List of Equipments/Machine Required:**

PCs with PIV/128 MB RAM/40 GB HD, VHDL, VERILOG, Any Device Simulator

## **Recommended Books:**

# *Chhattisgarh Swami Vivekanand Technical University, Bilai*

Semester : VIII

Subject: Digital Circuit Simulation Lab

Total Practical Periods: 50

Total Marks in End Semester Examination: 40

Branch: Electronics & Telecommunication

Code: 328823 (28)

## **Experiments to be performed:**

1. To Design, implement and Simulate the combinational logic circuit for the function  $f(A,B,C) = \Sigma(0,4,5,8,11,15) + d(1)$
2. To Design, implement and Simulate the Full adder using two half adder.
3. To Design, implement and Simulate the 8 bit adder using Full adder.
4. To Design, implement and Simulate the 3 : 8 Decoder.
5. To Design, implement and Simulate the 16 : 1 Multiplexer using 4 : 1 Multiplexer
6. To Design, implement and Simulate the Binary to BCD code Converter by Showing BCD No. on 7segment Display.
7. To Design, implement and Simulate the Look ahead carry.
8. To Design, implement and Simulate the Flip-Flop.
9. To Design, implement and Simulate the Ring Counter.
10. To Design, implement and Simulate the Decade counter using D-Flip-Flop.
11. To Design, implement and Simulate the Divide by 32 (+32) digital logic by counter and flip-flop.
12. To Design, implement and Simulate the Hamming code converter.
13. To Design, implement and Simulate the 4 bit comparator.
14. To Design, implement and Simulate the Finite State Machine by Moore method
15. To Design, implement and Simulate the Finite State Machine by Mealy circuit
16. To Design, implement and Simulate the Digital clock.

## **List of Equipments/Machine Required:**

1. PCs with simulation software like MULTISIM, COMSIM, MATLAB, TINA PRO installed

## **Recommended Books:**

1. D. V. Bout : *The Practical Digital Circuit Designer Lab Book* ; Prentice-Hall., 1999.

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**Semester : VIII**  
**Subject: Major Project**  
**Total Practical Periods: 60**  
**Total Marks in End Semester Examination: 100**

**Branch: Electronics & Telecommunication**  
**Code: 328824 (28)**

- The students are expected to take up a Project under the guidance of a faculty from the Institute. This may be an extension of the Minor project undertaken in VII semester or a new one.
- The topic of the project should be justified for the degree of BE (Electronics & Telecommunication)
- The project selected should ensure the satisfaction of the urgent need to establish a direct link between education, Industrial application, national development and productivities.
- The students may be asked to work individually or in a group having not more than FOUR students.
- The student/group of student should collect all necessary information from literature on selected topic/project.
- It should include the scope of project, identification of necessary data, source of data, development of design method and identification, methodology, software analysis (*if any*).
- Students should deliver a seminar on the selected Project/topic.
- The students are expected to submit the report in standard format approved by the University in partial fulfillment of the requirement for the degree of B.E. (Electronics & Telecommunication).
- There will be an external viva-voce at the end of the semester and the students are to demonstrate the project at the time of viva-voce.
- The project report should contain the following:
  - A cover page mentioning the project title, names of the students, Affiliated Institute/College, Session, Batch and the name of the University.
  - A bonafide certificate to be issued by the Head of the Institute.
  - A forwarding certificate from the Head of the Department.
  - A completion certificate from the Project guide.
  - A certificate of Approval from both Internal and External Examiner.
  - Acknowledgement from the students
  - Abstract
  - Contents
  - Description of the Project (to be divided in chapters)
  - Conclusion
  - Bibliography
  - A CD containing the Software/Program used in the project.



# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester : BE 8th

Subject: Report Writing & Seminar

Total No. of periods : 2 per week

Total marks in End Semester Exam: Nil

Minimum Number of class test to be conducted: Two

Branch: Electronics & Telecommunication

Code: 300825 (28)

Total Tutorial Periods : Nil

Teacher's Assessment: 40 marks

## **Unit -I**

**Introduction to Technical Writing:** how differs from other types of written communication Purpose of technical writing, Correspondence: prewriting, writing and rewriting Objectives of Technical Writing. Audience Recognition: High-tech audience, Low tech audience, Lay audience, Multiple Audience.

## **Unit - II**

**Correspondence:** Memos, Letters, E-mails, Its differentiation, types of letters, Document Design, its importance, Electronic Communication: Internet, Intranet, extranet, Writing effective e-mail.

## **Unit - III**

**Summary:** Report Strategies, Effective style of technical report writing: Structures: content, introduction, conclusions, references, etc., Presentation, Writing first draft, revising first draft, diagrams, graphs, tables, etc. report lay-out.

## **Unit -IV**

**Report Writing:** Criteria for report writing, Types of Report: Trip report, Progress report, lab report, Feasibility report, project report, incident report, etc. Case Studies.

## **Unit -V**

**Proposals & Presentation:** Title page, Cover letter, Table of Content, list of illustrations, summary, discussion, conclusion, references, glossary, appendix, Case Studies. Oral Presentation/ Seminar:

## **Text Books:**

1. Sharon J. Gerson & Steven M. Gerson "Technical Writing - Process& Product", Pearson Education.

## **Reference Books:**

1. Sunita Mishra, "Communication Skills for Engineers" Pearson Education
2. Davies J.W. "Communication for engineering students", Longman
3. Eisenberg, "Effective Technical Communication", Mc. Graw Hill.

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

**Semester: VIII**

**Subject :Enterprise Resource Planning**

**Total Theory Periods : 40**

**Total Marks in End Semester Exam : 80**

Minimum no. of class tests to be conducted : 2

**Branch : Common to All Branches**

**Code : 300881 (36)**

**Total Tut Periods : 10**

## **UNIT-I**

**Conceptual foundation of Business Process reengineering:** Role of information Technology and BPR; Process improvement and Process redesign, Process identification and mapping; Role/Activity diagrams, Process Visioning, and benchmarking.

[No of Periods: 8 + 2]

## **UNIT -2**

**Enterprise Resource Planning:** Evolution of ERP- MRP and MRP II, structure of ERP- two tier architecture, three tier architecture, Electronic data processing, management information system, Executive information system, ERP as an integrator of information needs at various Levels.

[No of Periods: 8 + 2]

## **UNIT -3**

**Typical Business Processes:** Core processes, Product control, Sales order processing, Purchases, Administrative processes, Human resource, Finance support processes, Marketing, Strategic planning, Research and development, Problems in traditional view.

[No of Periods: 8 + 2]

## **UNIT -4**

**ERP models/functionality:** Sales order processing, Production scheduling, forecasting, distribution, finance, features of each of the models, description of data flow across each module, overview of supporting databases & packages.

[No of Periods: 8 + 2]

## **UNIT -5**

**ERP implementation issues:** Opportunities and problems in ERP selection, and implementation; ERP implementation: identifying ERP benefits, team formation, Consultant intervention, Selection of ERP, Process of ERP.

[No of Periods: 8 + 2]

## **Books:**

1. V.K. GARG & N .K. VENKATKRISHNAN:, ERP, Concepts and Practices, PM
2. Rahul V. Altekar, Enterprise wide Resource Planning-theory and practice, PHI

## **References:**

1. ALEXIS LEON: Enterprise Resource Planning, TMH
2. S. SADAGOPAN: MIS, PM
3. V. RAJARAMAN: Analysis and Design of Information Systems, PHI
4. **MONK' & BRADY: Concepts in ERP, Vikas pub, Thomson**

# **CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI (C.G.)**

Semester: **VIII**

Subject: **E-Commerce and Strategic IT**

Total Theory Periods: **50**

Total Marks in End Semester Exam: **80.**

Minimum number of class tests to be conducted: **02**

Branch: **Common to All Branches**

Code: **300882 (33)**

Total Tutorial Periods: **Nil**

**UNIT – I** Introduction: What is E-Commerce, Forces behind E-Commerce, E-Commerce Industry Framework, and Brief History of E-Commerce. Inter Organizational E-Commerce, Intra Organizational E-Commerce, and Consumer to Business Electronic Commerce, Architectural framework

## **Unit - II**

Network Infrastructure : LAN, Ethernet(IEEE standard 802.3) LAN , WAN , Internet, TCP/IP Reference Model, Domain Name Server , Internet Industry Structure,

## **UNIT – III**

Electronic payment systems, types of electronic payment systems, digital token-based electronic payment systems, smart cards & electronic payment systems, credit card based electronic payment systems, risk and electronic payment systems, designing electronic payment systems.

## **UNIT – IV**

Information Distribution and Messaging: FTP,E-Mail,WWW server,HTTP, Web service implementation, Information publishing , Web Browsers, HTML, Common Gateway Interface

**UNIT – V** Mobile & wireless computing fundamentals, mobile computing framework, wireless delivery technology and switching methods, mobile information access devices, mobile data internetworking standards, cellular data communication protocols, mobile computing applications, personal communication service.

## **BOOKS :**

1. Frontiers of E-commerce by Kalakota & Whinston (Addison-wesley) E-business roadmap for success by Dr. Ravi Kalakota & Marcia Robinson ( addision wesicy)
2. Electronic Commerce By Bharat Bhasker (TMH)

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: VIII

Subject Name: Technology Management

Total Theory periods: 40

Total Marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 02

Branch: **Common to All Branches**

Subject Code: 300883 (36)

Total Tutorial periods: 10

## Unit I

Technology: - Definitions, Types and Characteristics, Management of Technology (MOT), Technological Environment, Parameters of Technological Environment; Science & Technology in India.  
[No of Periods: 8 + 2]

## Unit II

Innovation Management: - Invention v/s Innovation, Definition and components of innovation. Types of innovations: Product, Process and system innovations, Understanding Innovation Process.  
[No of Periods: 8+ 2]

## Unit III

Technology life cycle, Technology evolution and S-curves of Technology Evolution, Technology Diffusion, Dynamics of Diffusion, Mechanism of Diffusion.  
[No of Periods: 8 + 2]

## Unit IV

Technology strategies & Intelligence: Technology Strategy & types, Models for technology strategy formulation Definition of Technology Intelligence, Technology Audit, Process of Technology Intelligence: Technology Scanning, Monitoring, Forecasting and Assessment.  
[No of Periods: 8 + 2]

## Unit V

Acquisition and technology transfer. **Over view of - GATT, Intellectual property rights (IPR)**  
[No of Periods: 8 + 2]

## Texts Books:

1. V. K. Narayanan, "Managing Technology and Innovation for competitive advantage", Pearson Education.
2. Tarek Khalil, "Management of Technology", McGraw Hill.

## Reference Books:

1. Lowell Steele, "Managing Technology", McGraw Hill.
2. R. A. Burgelman and M. A. Maidique, "Strategic Management of Technology and Innovation", Irwin.
3. Plsek, Crativity, Innovation and Quality, PHI

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

**Semester: VIII**

**Subject: Decision Support and Executive Information System**

**Total Theory Periods: 50**

**Total Marks in End Semester Exam: 80.**

**Minimum number of class tests to be conducted: 02.**

**Branch: Common to all Branches**

**Code: 300884(33)**

**Total Tut Periods: Nil.**

## **UNIT-I Decision Support System:**

What is a DSS, Decision Making Rational Decisions, Definitions of Rationality, Bounded Rationality and Muddling Through, The Nature of Managers, Appropriate Data Support, Information Processing Models, Group Decision Making?

## **UNIT-II Component OF DSS:**

Data Component : Information and its Usefulness, Characteristics of Information, Databases to Support Decision Making, Database Management Systems, Data Warehouses, Data Mining and Intelligent Agents

Model Component:-Models Representation Methodology, TimeModel Based ManagementSystems, Access to Models Understandability of Results, Integrating Models Sensitivity of aDecision, Brainstorming and Alternative Generation, Evaluating Alternatives, Running External Models.

Mail Component: Integration of Mail Management Examples of Use implications for DSS.

## **Unit-III Intelligence and Decision Support Systems:**

Programming Reasoning, Backward Chaining Reasoning, Forward Chaining Reasoning, Comparison, Certainty Factors, User-Interface Component: User Interface Components, The Action Language, Menus, Command Language, I/O Structured Formats, Free Form Natural Language, The Display or Presentation Language, Windowing Representations, Perceived Ownership of Analyses, Graphs and Bias Support for All Phases of Decision Making, The Knowledge Base Modes of Communication

**Unit-IV** Designing A DSS: Planning for DSS, Designing a Specific DSS, Interviewing Techniques, Other Techniques, Situational Analysis Design Approaches, Systems Built from Scratch, Using Technology to Form the Basis of the DSS, Evaluating a DSS Generator, Using a DSS Generator, The Design Team, DSS Design and Re-engineering Discussion .

**Unit-V** Implementation and Evaluation of DSS : Implementation Strategy , Prototypes, Interviewing , User Involvement , Commitment to Change, Managing Change, Institutionalize System, Implementation and System Evaluation, Technical Appropriateness, Measurement Challenges , Organizational Appropriateness.

## **Name Of Text Books:-**

Decision Support System By Vicki I Sauter

Management Information system-Gerald V. Post & David L. Anderson

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: VIII  
Subject: Software Technology  
Total Theory Periods: 4 per week.  
Total Marks in End Semester Exam: 80.  
Minimum number of class tests to be conducted: 02.

Branch: **Common to All Branches.**  
Code: 300885 (22)  
Total Tut Periods: Nil.

## UNIT-1

### ASSEMBLY LANGUAGE PROGRAMMING

Pentium Assembly languages-Registers, Memory Model, Addressing mode, 1source Link, Installation, Assembler Directives.

### ASSEMBLER DESIGN

Simple manual Assembler, Assembler Design Process, Load and Go Assembler, Object File Formats.

## UNIT-2

### LINKERS

Linking -Combining Object Modules, Pass I, Pass II; Library Linking; Position Independent Code (PIC); Shared Library Linking.

LOADERS- Binary Image; Types of Loaders.

## UNIT 3

### MACROPROCESSORS

Macro in NASM- Local Labels in Macro Body, Nested Macros.; Design of Macroprocessors – Major Data Structures, Macroprocessing Technique, Simple macroprocessors without nesting, Nested calls & definitions

## UNIT – 4

### COMPILERS

Lexical Analysis; Syntax Analysis; Intermediate Code Generation; Target Code Generation; Optimizing Transformation

## UNIT – 5

### TEXT EDITORS

Design of a Text Editor ; Data Structures for Text Sequences; Text Document Design; Text view Design

### DEBUGGER

Features; Breakpoint mechanism; Hardware support; context of Debugger; Check pointing & reverse Execution

### Textbooks

1. SYSTEM SOFTWARE by Santanu Chattopadhyay ; Prentice Hall of India
2. Software Engineering By Roger S Pressman ; Mc-Graw Hill

### References

1. Foundations of Software Technology and Theoretical Computer Science, By V. (Venkatesh) Raman: Springer
2. Software Visualization by John Stasko; MIT press
3. Software Engineering By Rajib Mall : PHI

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

**Semester: VIII**  
**Subject: Knowledge Entrepreneurship**  
**Total Theory Periods: 40**  
**Total Marks in End Semester Exam:80**  
Minimum no. of class tests to be conducted: 2

**Branch: Common to All Branches**  
**Code: 300886 (36)**  
**Total Tut Periods: 12**

## **Unit – I**

**Introduction:** Entrepreneurship in Knowledge economy, abundant & accessible information, implication, impact & consequence, knowledge based opportunities, aims, scope, and objectives.

## **Unit-II**

### **Managing knowledge & intellectual capital:**

Knowledge management, loss of knowledge, knowledge implementation, knowledge creation, property intellectual capital.

## **Unit-III**

### **Contemporary information problems:**

Information overload, winning & losing barrier to entry, emerging issues, customers, investors, myth of inevitable program.

## **Unit-IV**

Creating enterprise cultures:

Working with employer, organizing for entrepreneurship, unity & diversity, ten essential freedoms, freedom of operation, effective issue monitoring, establish search criteria.

## **Unit-V**

### **Becoming a knowledge entrepreneur:**

Entrepreneur qualities, knowledge entrepreneur, challenge of launching new product, creating launch support tool, examples of best practice.

## **Text & Reference Books**

Amrit Tiwana ,The Knowledge Management tool kit, Pearson Education.

Lunlin Conlson, Knowledge Entrepreneur, Thomas Press.

Catheriue L Mann, Knowledge entrepreneurship, Oxford

Heinke Robkern ,Knowledge entrepreneurship,.

Bonnie Montano,Knowledge Management, , IRM Press, London

## **CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI (C.G.)**

Semester: VIII  
Subject: Financial Management  
Total Theory Periods: 3  
Total Marks in End Semester Exam: 80  
Minimum No. Of Class test to be conducted: 2

Branch: **Common to All Branches**  
Code: 300887(36)  
Total tutorial Period: 12

### **UNIT I**

Financial Management -an overview: Introduction, finance and other disciplines, objectives and scope of financial management, role and responsibility of finance manager.

[No of Periods: 8 + 2]

### **UNIT II**

Working capital management-nature, need, importance and concept of working capital, trade off between profitability and risk, Determining finance mix.

[No of Periods: 8 + 2]

### **UNIT III**

Inventory management-Introduction, objectives, ordering cost, carrying cost, lead time, economic order quantity and safety stock, deterministic model.

[No of Periods: 8 + 2]

### **UNIT IV**

Management of cash-introduction motives for holding cash, objectives of cash management and technique/process of cash management.

[No of Periods: 8 + 2]

### **UNIT V**

Receivables management-introduction, objectives, credit terms, credit policies and collection policies.

[No of Periods: 8 + 2]

### **Text books:**

Basic financial management, M Y Khan and P K Jain, TMH  
Financial Management, I M Pandey.

### **References books:**

Financial management and policy, V K Bhalla, Anmol publications pvt. Ltd.  
Financial management, Van Horne.



# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI (C.G.)

Semester : VIII  
Subject : Project planning management and Evaluation  
Total Theory Periods : 40  
Total Marks in End Semester Exam :80  
Minimum No. Of Class test to be conducted : 2

Branch : **Common to All Branches**  
Code : 300888 (36)  
Total tutorial Period : 12

## **UNIT I**

Identification of projects-generation and screening of idea, monitoring corporate appraisal, preparing project profiles and project rating index.

## **UNIT II**

Feasibility studies: Market and demand analysis, technical analysis, financial analysis and economic viability.

## **UNIT III**

Project appraisal: Criteria, net present value, internal rate of return, payback period and accounting rate of return method.

## **UNIT IV**

Project management and implementation-  
Project planning, project control, prerequisites of implementation. Network techniques of project management-Project evaluation and review technique (PERT) and critical path method (CPM).

## **UNIT V**

Project review and control-  
Initial review, performance evaluation, abandonment analysis and its behavioral issues.

### **Text books:**

Project planning, analysis, selection, implementation and review by Prasanna Chandra, TMH.

Reference Books:

Project management-Dr. Harold Kerzner.

Total Project management-Dr. P K Macmillan.

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI (C.G.)

Semester: VIII

Subject: **Safety Engineering**

Total Theory Periods: 50

Total Marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: **Common to All Branches**

Code: 300889 (37)

Total Tutorial Period : 12

## **UNIT – I**

Safety Philosophy and principles of Accident prevention

Introduction, accident, injury, unsafe act, unsafe condition, reportable accidents, need for safety, break down of accidents, hazardous industries.

Theories & Principle of accidents

Casualty, cost of accident, computation of cost, utility of cost data.

Accident reporting & Investigation

Identification of the key facts, corrective actions, classification of facts.

Regulation

American (OSHA) and Indian Regulation.

## **UNIT – II**

Safety Management

Division of responsibility, Location of Safety function, size of safety department, qualification for safety specialist, safety committee – structure and functions.

## **UNIT – III**

Safe Working Condition and Their Development

SOP for various Mechanical equipments, Incidental safety devices and methods, statutory of provisions related to safeguarding of Machinery and working condition.

## **UNIT – IV**

Safety in Operation and Maintenance

Operational activities and hazards, starting and shut down procedures, safe operation of pumps, compressor, heaters, reactors, work permit system, entry into confined spaces.

## **UNIT – V**

Safety in Storage and Emergency Planning

Safety in storage, handling of chemicals and gases, storage layout, ventilation, safety in chemical laboratories, emergency preparedness on site plan, off site plan, toxic hazard control.

## **TEXT BOOKS**

Safety and Accident Prevention in Chemical Operation – H.H. Fawcett and Wood

Personal Protective Equipment – NSC Bombay

## **REFERENCE BOOKS**

Ergonomics - P. Krishna Murthy

Fire Prevention Hand Book – Derek James

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: VIII

Subject: Bioinformatics

Total Theory Periods: 4 per week.

Total Marks in End Semester Exam: 80.

Minimum number of class tests to be conducted: 02.

Branch: **Common to All Branches**

Code: 300890 (22)

Total Tut Periods: Nil.

## UNIT-1

Bioinformatics-introduction, Application, Data Bases and Data Management, Central Dogma; information search and Data retrieval, Genome Analysis and Gene mapping- Analysis, Mapping, Human Genome Project (HGP).

## UNIT-2

Alignment of Pairs and Sequences; Alignment of Multiple Sequences and Phylogenetic Analysis; Tools for similarity Search and Sequence Alignment- FASTA BLAST.

## UNIT-3

Profiles and Hidden Markov Models (HMMs); Gene Identification and Prediction-Basics, Pattern Recognition, Methods and Tools; Gene Expression and Micro arrays.

## UNIT-4

Protein Classification and Structure Visualization; Protein Structure Prediction; Proteomics; Computational methods-Analysis of Pathways, Metabolic Network Properties, Metabolic Control Analysis, Stimulation of Cellular Activities, Biological Mark Up Languages.

## UNIT-5

Drug Discovery-Introduction, Technology and Strategies, Cell Cycle, G-protein, Coupled, Receptors. Computer Aided Drug Design-Introduction, Drug Design Approaches, Designing methods, ADME-Tox Property Prediction.

## TEXT BOOKS

- I. BIOINFORMATICS by S.C. Rastogy, 2<sup>nd</sup> Edition, Prentice Hall of India.
- II. BIOINFORMATICS by V. R Srinivas, Prentice Hall of India

## REFERENCES

1. BIOINFORMATIC COMPUTING by Bergeron, MIT Press.
2. Evolutionary Computation in Bioinformatics, Gary B. Fogel, David W. Corne (Editors), 2002
3. Introduction to Bioinformatics, Arthur M. Lesk, 2002, Oxford University Press
4. Current Topics in Computational Molecular Biology (Computational Molecular Biology), Tao Jiang, Ying Xu, Michael Zhang (Editors), 2002, MIT Press

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI (C.G.)

Semester: VIII

Subject: Energy Conservation & Management

Total Theory Periods: 50

Total Marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: **Common to All Branches**

Code: 300891 (37)

Total Tutorial Period : 12

## UNIT - I

### Energy Scenario

Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, re-structuring of the energy supply sector, energy strategy for the future, air pollution, climate change, Energy Conservation Act – 2001 and its features.

## UNIT - II

### Energy Conservation in Electric Utility and Industry

Energy costs and two-part tariff, Energy conservation in utility by improving load factor, Load curve analysis, Energy efficient motors, Energy conservation in illumination systems, Importance of Power factor in energy conservation – Power factor improvement methods, Energy conservation in industries, case studies.

## UNIT - III

### Energy in Manufacturing

Introduction, Energy and Environmental Analysis of Products, Energy Consumption in Manufacturing, Energy Conservation, Transportation Systems, Water Conservation, Rules for the Efficient Conservation of Energy and Materials, Laws of Energy and Materials Flows.

## UNIT - IV

### Heat Recovery System

Sources of waste heat and its potential applications, heat recovery systems in Shell & Tube Heat Exchangers, Plate Heat Exchangers, Tubular Heat Exchangers. Vapour recompression and Energy conservation in Evaporator systems. Thermal Wheel, Heat Pipe, Heat Pumps. Waste Heat Boilers – Low Pressure & High Pressure Applications.

## UNIT - V

### Energy Conservation Economics

Basic discounting, life cycle costing and other methods, factors affecting economics, energy pricing and incentives for conservation, energy conservation of available work identification of irreversible processes, primary energy sources, Optimum use of prime movers, energy efficient house keeping, energy recovery in thermal systems, waste systems and waste heat recovery in thermal systems, waste heat recovery techniques, conservation in energy intensive industries, thermal insulation.

## TEXT BOOKS

1. Energy Management – W.R. Murphy, G. McKay –
2. Energy Management – Paul O'Callaghan –
3. Engineering Economics & Engineering Management – R. Raju – Anuradha Agencies

## REFERENCE BOOKS

1. Principles of Energy Conversion – Archie W. Culp – Jr. International Student Edition – McGraw Hill Publishers
2. Energy Management in illuminating System – Kao Chen – CRC Publishers
3. Industrial Energy Recovery - D.A. Reay – Wiley Publishers
4. Thermal Energy Recovery – T.L. Boyer – Wiley Publishers
5. Energy Conservation Through Control – E.G. Shinskey – Academic Press
6. Economics of Solar Energy & Conservation Systems, Vol-I & II – F. Kreith & R.E. West – CRC Press

# **CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI (C.G.)**

Semester: VIII  
Subject: Nanotechnology  
Total Theory Periods: 50

Total Marks in End Semester Exam: 80  
Minimum No. of Class test to be conducted:2

Branch: Common to All Branches  
Code: 300892 (47)  
Total tutorial Period: NIL

**Unit I** : Introduction to nanotechnology: background, definition , basic ideas about atoms and molecules, physics of solid state, review of properties of matter and quantum mechanics

**Unit II** : Preparation of Nanostructured Materials : Lithography : nanoscale lithography, E-beam lithography, dip pen lithography, nanosphere lithography. Sol gel technique Molecular synthesis, Self-assembly, Polymerization

**Unit III** : Characterization of Nanostructured materials : Microscopy: TEM, SEM, SPM techniques, confocal scanning microscopy,, Raman microscopy-Basic principles, applicability and practice to colloidal, macromolecular and thin film systems. Sample preparation and artifacts. Polymer fractionation techniques: SEC, FFF, Gel electrophoresis.: Basic theory, principles and practice.  
Thermal analysis: Basic principles, theory and practice. Micro DSC in the study of phase behavior and conformational change.  
Mass spectrometry of polymers: MALDI TOF MS – Basic theory, principles and practice. Applicability to proteins, polyethers, controlled architecture systems

**Unit IV** : Cross-cutting Areas of Application of Nanotechnology : Energy storage, Production and Conversion. Agriculture productivity enhancement Water treatment and remediation. Disease diagnosis and screening. Drug delivery systems. Food processing and storage. Air pollution and remediation. Construction. Health monitoring..Vector and pest detection, and control. Biomedical applications. Molecular electronics. Nanophotonics. Emerging trends in applications of nanotechnology

**Unit V** : Industrial Implications of Nanotechnology : Development of carbon nanotube based composites. Nanocrystalline silver Antistatic conductive coatings. Nanometric powders. Sintered ceramics. Nanoparticle ZnO and TiO<sub>2</sub> for sun barrier products. Quantum dots for biomarkers. Sensors. Molecular electronics. Other significant implications

## **References:**

1. Guozhong Cao, "Nanostructures and Nanomaterials", Imperial College Press, London
2. Mark Ratner and Daniel Ratner, "A Gentle Introduction to Next Big Thing", Pearson Education 2005

# **CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI (C.G.)**

Semester: VIII

Branch: **Common to All**

## **Branches**

Subject: Intellectual Property Rights

Code: 300893 (36)

Total Theory Periods: 40

Total tutorial Period: 12

Total Marks in End Semester Exam: 80

Minimum No. Of Class test to be conducted:2

## **Unit-I**

Basic Concepts of Intellectual Property: Introduction to intellectual property rights, laws and its Scope, Trade Related Aspects of Intellectual Property Rights.

## **Unit-II**

Patents: Introduction to patent law and condition for patentability, Procedure for obtaining patents, Rights of a patentee, Patent infringements, Biotechnology patents and patents on computer programs, Patents from an international perspective.

## **Unit-III**

Trademark and 'geographical Indications: Statutory authorities and registration procedure, Rights conferred by registration, Licensing, assignment and transfer of trademark rights, Trademark infringement, Geographical Indication of Goods & Appellations of Origin.

## **Unit-IV**

Copyright: Registration procedure and copyright authorities, Assignment and transfer of copyright, copyright infringement and exceptions to infringement, Software copyright

## **Unit-V**

Introduction to the law on Industrial Designs, Registration and piracy, International perspective, Introduction to the law on semiconductor layout design, Registration, commercial exploitation and infringement.

## **Text Books:**

1. Vinod V Sople ,Managing Intellectual Property, – PHI
2. Kumar K ,Cyber law, intellectual property and e-commerce security, Dominant Publication and distribution, New Delhi.

## **Reference Books:**

1. Inventors Guide to Trademarks and Patents- Craig Fellenstein, Rachel Ralson- Pearson Education.
2. Intellectual Property –David Bainbridge, Longman

## **CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY BHILAI (C.G.)**

Semester: VIII

Subject: Value Engineering

Total Theory Periods: 50

Total Marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: **Common to All Branches**

Code: 300894 (37)

Total Tutorial Period: 12

### **UNIT - I**

#### **Basic Concepts**

Meaning of the term value, basic kind, reasons for poor value, value addition, origin and history. Benefits, relevance in Indian scenario.

### **UNIT - II**

#### **Techniques**

Different techniques, organizing value engineering study, value engineering and quality.

### **UNIT - III**

#### **Job Plan**

Different phases, General phase, Information phase, Functional Phase, Creation Phase, Evaluation Phase, Investigation Phase, Implementation Phase, Audit.

### **UNIT - IV**

#### **Selection of evaluation of VE Projects**

Project selection, method selection, value standard, application of methodology.

### **UNIT - V**

#### **Value Engineering Program**

VE operations in maintenance and repair activities, VE Cost, life cycle, cost model, training for VE, general value engineering, case studies.

### **TEXT BOOKS**

Value Engineering - S.S. Iyer - New Age International Publishers, New Delhi

Industrial Engineering & Management - O.P. Khanna - Dhanpat Rai & Sons

### **REFERENCES**

Techniques of Value Analysis and Engineering - L.D. Miles - McGraw Hill, New York

Value Engineering, A Systematic Approach - A.E. Mudge - McGraw Hill, New York

Compendium on Value Engineering - H.G. Tufty - Indo American Society

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester: VIII

Subject: Disaster Management

Total Theory Periods: 40

Total Marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: **Common to All Branches**

Code: 300895 (20)

Total Tutorial Periods: 12

## **Unit 1**

Nature of disasters – natural and other disasters, Earthquakes, floods, draught, cyclones, fire and other environmental disasters.

## **Unit 2**

Behaviour of structures in disaster prone areas, Disaster zoning, Hazard assessment, Environmental Impact Assessment

## **Unit 3**

Methods of mitigating damage during disasters, disaster preparedness.

## **Unit 4**

Management systems during disasters, Construction Technology for mitigation of damage of structures.

## **Unit 5**

Short-term and long-term relief measures.

### **Name of Text Books:**

Design of Earthquake Resistant Buildings – Minoru Wakabayashi (McGraw Hill Publication)

Dynamics of Structures: Theory and Application to Earthquake Engineering (2<sup>nd</sup> edition) – Anil K Chopra (Pearson Education Publication)

### **Name of Reference Books:**

Fundamentals of Vibrations – Anderson, R.A. (Mc Millan)

IS – 1893 (Part I): 2002, IS – 13920: 1993, IS – 4326: 1993, IS-13828: 1993

Earth quake engineering damage assessment and structural design – S.F. Borg

Disasters and development – Cuny F (Oxford University Press Publication)



# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester: VIII

Subject: Construction Management

Total Theory Periods: 40

Total Marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: **Common to All Branches**

Code: 300896 (20)

Total Tutorial Periods: 12

## **Unit 1**

### **The Owner's Perspective**

Introduction-The project life cycle-Major Types of Construction-Selection of Professional Services-Construction contractors-Financing of constructed facilities-Legal and regulatory Requirements-The changing Environment of the construction Industry-The Role Project Managers

## **Unit 2**

### **Organizing for Project Management**

What is project management? – Trends in Modern Management-Strategic planning and project programming- Effects of project risks on organization-Organization of Project Participants-Traditional designer-Constructor sequence-Professional construction management-Owner-Builder-Operation-Turnkey operation-Leadership and Motivation for the Project team-Interpersonal behaviour in project organization-perceptions of Owners and Contractors

## **Unit 3**

### **The Design and Construction Process**

Design and construction as an integrated system-Innovation and technological Feasibility-Innovation and technological feasibility-Design Methodology-Functional Design-Physical Structures-Geo-Technical Engineering Investigation-Construction Site Environment-Value engineering-Construction Planning-Industrialized Construction and Prefabrication-Computer -Aided Engineering

## **Unit 4**

### **Labour, Material and Equipment Utilization**

Historical Perspective – Labour Productivity-Factors Affecting Job-Site Productivity-Labor Relations in construction-Problems in collective bargaining-Materials Management-Materials Procurement and Delivery- Inventory control-Tradeoffs of cost in Material Management-Construction Equipment-Choice of Equipment and Standard production Rates-Construction Processes Queues and Resource Bottlenecks

## **Unit 5**

### **Cost Estimation**

Costs Associated with Construction Facilities-Approaches to cost estimation-Type of construction cost estimates- Effects of scale on construction cost-Unit cost-Method of estimation-Methods for allocation of joint costs- Historical cost data-Cost indices-Applications of cost Indices to Estimating-Estimate based on Engineers List of Quantities-Allocation of Construction costs over time-Computer Aided cost Estimation-Estimation of operating costs

### **Name of Text Books:**

Construction Project Management Planning, Scheduling and Control – Chitkara, K.K. (Tata McGraw Hill Publishing Co., New Delhi, 1998)

Project Mangement: A systems Approach to Planning, Scheduling and Controlling – Harold Kerzner (CBS Publishers & Distributors, Delhi, 1988)

### **Name of Reference Books:**

Project management for Construction: Fundamental Concepts for owners, Engineers, Architects and Builders – Chris Hendrickson and Tung Au, (Prentice Hall, Pittsburgh, 2000)

Construction Project Management – Frederick E.Gould (Wentworth Institute of Technology, Vary E.Joyce, Massachusetts Institute of Technology, 2000)

Project Management – Choudhury, S. (Tata McGraw Hill Publishing Co., New Delhi, 1988)

Applied project Engineering and Management – Ernest E. Ludwig (Gulf Publishing Co., Houston, Texas, 1988)

# ***Chhattisgarh Swami Vivekanand Technical University, Bhilai***

Semester: VIII  
Subject: Ecology and Sustainable Development  
Total Theory Periods: 40  
Total Marks in End Semester Exam: 80  
Minimum number of class tests to be conducted: 2

Branch: **Common to All Branches**  
Code: 300897 (20)  
Total Tutorial Periods: 12

## **Unit 1**

### **Nature of ecology and sustainable development**

Definition, scope of ecology and sustainable development, geomorphology, oceanography, climatology and biogeography.

## **Unit 2**

### **Energy and environment**

Introduction of energy environment, use of solar cells for heating and operated drills, methane gas digesters, environmentally friendly method of energy conservation, difference between conventional and non-conventional energy sources, future trends of energy systems.

## **Unit 3**

### **Theory of isostasy**

Concept of isostasy for sustainable development, discovery of the concept, concept of Hayford and Bowie, Joly, and Holmes, Global isostatic adjustment.

## **Unit 4**

### **Physical geography and man human impact on the natural environment**

Modification of land forms, direct alternation of land forms, wind deflation, coastal erosion and deposition, modification of the atmosphere, ultration process in eco and energy systems.

## **Unit 5**

### **Obstacles in sustainable development**

Pollution growth, species extinction, restriction of bat lands, desertification, soil erosion, soil pollution, characterisation of contaminated soil, global warming and ozone depletion etc.

### **Name of Text Books:**

Energy and environment - Fowler (McGraw Hill, New Delhi)

Restoration Ecology and sustainable development - Krystyna M. Urbanska et.al. (Cambridge University Press, U.K.)

### **Name of Reference Books:**

Reuniting Economy and Ecology in Sustainable Development - Russ Beaton et.al. (-----)

Theory and implementation of economic models for sustainable development - Jeroen C.J.M. Van Den Bergh (-----)

Economy and Ecology: Towards sustainable development - F. Archibugi et.al. (-----)

Evaluating Sustainable Development: Giving People a voice in their destiny - Okechukwu Ukaga et.al. (-----)

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: VIII

Subject: Non Conventional Energy Sources

Total Theory Periods: 50

Total Marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 02

Note: Internal Choice may be given in any three units.

Branch: **Common to All Branches**

Code : 300898 (19)

Total Tutorial Periods: 00

## Unit I

Environmental Aspects of Power Generation, Heat Transfer for Solar Energy, Utilization Flat Plate Collectors: Physical principles of conversion of solar radiation into heat, Thermal losses and efficiency of FPC, Practical considerations for flat plate collectors, Applications of FPC – Water heating and drying .Focusing Type Collectors: Orientation and sun tracking systems, Types of concentrating collectors – Cylindrical parabolic collector, Compound parabolic collector, Thermal performance of focusing collectors, Testing of solar collectors.

## Unit II

Solar cooking, solar desalination, solar ponds and solar space heating Solar Industrial process heating and Solar power generation. Solar Green Houses, Solar thermo mechanical power, solar refrigeration & air conditioning and Solar High Temperature Applications Gasifier- Classification, Chemistry, Application, advantages, disadvantages and application.

## Unit III

Energy from Biomass: Type of biomass sources, biomass generation, factors affecting biodigestion, classification, advantages and disadvantages of biogas plants, community biogas plants, problems related to biogas plants, utilization of biogas. Energy plantation, methods for obtaining energy from biomass, thermal gasification of biomass.

## Unit IV

Chemical Energy Sources: Fuel cells: Design, principle, classification, types, advantages and disadvantages Hydrogen Energy: Properties of hydrogen, methods of hydrogen production, physical and chemical principles, storage, advantages and application

## Unit V

Wind Energy: Basic principle, wind energy conversion, wind energy conversion systems, design consideration, performance and application. Alcohol fuels: Overview, feedstock, methods for alcohol production, alcohol as an engine fuel; LPG, CNG Hydrogen and Ethanol as an alternative liquid fuel; engine performance with alcohol fuels. Tidal Energy.

### Name of Text Books:

1. John A Duffie & William A Beckman: Solar Energy Thermal processes Wiley Inter science publication
- 2 H P Garg & J Prakash, Solar Energy - Fundamentals and Applications: - Wiley Inter science

### Name of Reference Books:

1. G D Rai, Solar Energy Utilization - Khanna publishers.
2. S P Sukhatme, Solar Energy - Principles of thermal Collection & Storage - Tata McGraw Hill Publishing company ltd., New Delhi

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester: VIII  
Subject: Energy Auditing  
Total Theory Periods: 50  
Total Marks in End Semester Exam: 80  
Minimum number of Class tests to be conducted: 2

Branch: **Common to All Branches**  
Code: 300899 (24)  
Total Tut Periods: Nil

## **UNIT I:**

History of Energy Management: Energy forecasting, Limitations of energy resources. Renewable energy resources. Load management. Energy management. Demand side management (DSM) Energy conservation in realistic distribution system. Short term load forecasting for de-centralized load management.

## **UNIT II:**

Energy Situation and Global Energy Sources: World energy consumption. Energy in developing countries. Firewood crises. Indian energy sources. Non-conventional renewable energy sources. Potential of renewable energy sources. Solar energy types. Wind energy. Wave, tidal and OTEC. Super-conductors in power system. Wind power generation for large scale generation of electricity. Wind driven induction generators.

## **UNIT III:**

Energy Auditing as Applicable to an Industry: Classification of energy audit System optimization. Power factor improvement. Preventive maintenance. Process modification. Non-conventional energy sources. Electricity tariffs. Types of off-peak tariffs.

## **UNIT IV:**

Elements of Energy Auditing and Metering Methodologies(Case Studies): Capacity utilization. Technology up-gradation. Fine tuning, Energy conservation. Concept and methods of energy conservation.

## **UNIT V:**

Demand Side Management: Introduction to DSM. Concept of DSM. Benefits from DSM. DSM techniques. Time of day pricing, Multi-utility exchange model. Time of day pricing models for planning, load management. Load priority technique. Peak clipping. Peak shifting. Valley filling. Strategic conservation. Energy efficient equipment, Socioeconomic awareness programs.

## **Text Books:**

1. Ashok.V.Desai(ED)-Energy Demand: Analysis, Management and Conservation, Wiley Eastern Ltd., New Delhi.
2. S. Rao, Parulekar, Energy technology, Khanna Pbs.

## **Reference Books:**

1. Jyothi Prakash- Demand Side Management, Tata McGraw-Hill Publishers.
2. N.K.Bansal, Kleeman Millin-Renewable Energy Sources and Conservation Technology, Tata McGraw-Hill Publishers.