

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

## Scheme of Teaching and Examination

### B.E. VI SEMESTER ELECTRONICS AND INSTRUMENTATION

S.No.	Board of studies	Subject Code	Subject Name	Period Per Week			Scheme of Exam			Total Marks	Credit L+(T+P)/2
				L	T	P	Theory / Practical				
							ESE	CT	TA		
1	Electronics & Instrumentation	327611 (27)	Process Dynamics and Control	3	1	-	80	20	20	120	4
2	Electronics & Instrumentation	327612 (27)	Power Electronic Devices & Applications	3	1	-	80	20	20	120	4
3	Electronics & Instrumentation	327613 (27)	Industrial Instrumentation - II	3	1	-	80	20	20	120	4
4	Electronics & Instrumentation	327614 (27)	Digital Signal Processing	3	1	-	80	20	20	120	4
5	Electronics & Telecom.	328613 (28)	Advanced Microprocessor & Interfacing	3	1	-	80	20	20	120	4
6	Refer Table - I		Elective - I	3	-	-	80	20	20	120	3
7	Electronics & Instrumentation	327621 (27)	Industrial Instrumentation Laboratory – II	-	-	2	40	-	20	60	1
8	Electronics & Instrumentation	327622 (27)	Advanced Microprocessor & Interfacing Laboratory	-	-	4	40	-	20	60	2
9	Electronics & Instrumentation	327623 (27)	Digital Signal Processing Laboratory	-	-	4	40	-	20	60	2
10	Electronics & Instrumentation	327625 (27)	Power Electronic Devices & Applications Lab	-	-	4	40	-	20	60	2
11	Management	300625 (36)	Managerial Skills	-	-	2	-	-	40	40	1
			Library	-	-	1	-	-	-	-	-
<b>Total</b>				<b>18</b>	<b>5</b>	<b>17</b>	<b>640</b>	<b>120</b>	<b>240</b>	<b>1000</b>	<b>31</b>

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

\* To be completed after IV Semester and before the commencement of V Semester

**Note :-** Industrial Training of twelve weeks is mandatory for B.E. students. It is to be completed in two equal parts. The first part must have been completed in summer after IV sem. The second part to be completed during summer after VI sem. after which students have to submit a training report which will be evaluated by college teachers during B.E. VII sem.

**Table - I**  
**Professional Elective - I**

Sl. No.	Board of Study	Code	Subject
1	Electronics & Instrumentation	327631 (27)	Process Control Instrumentation
2	Electronics & Instrumentation	327632 (27)	Microeletronic Devices & VLSI Technology
3	Electronics & Instrumentation	327633 (27)	Telecommunication Switching & Computer Network
4	Electronics & Instrumentation	327634 (27)	Audio & Video Engineering
5	Electronics & Instrumentation	327635 (27)	High Frequency Electronics
6	Electronics & Instrumentation	327636 (27)	AI & Expert Systems

Note (1) - 1/4<sup>th</sup> 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 (C.G.)

Semester : **VI**

Subject: **Process Dynamics & Control**

Total Theory Periods: **40**

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

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

Branch: **E&I/AE&I**

Code: **327611 (27)**

Total Tutorial Periods: **12**

## **Unit I : Process Dynamics**

Elements of process control - process variables - degrees of freedom - Characteristics of liquid system, gas system, thermal system - Mathematical model of liquid process, gas process, flow process, thermal process, mixing process - Batch process and continuous process - Self regulation.

## **Unit II : Basic Control Actions**

Characteristics of on-off, proportional, single -speed floating control, integral and derivative modes - composite control modes - PI, PD and PID control modes - Response of controllers for different types of test inputs - Integral wind up - Auto - manual transfer - Selection of control mode for different processes - Typical control schemes for level, flow, pressure and temperature.

## **Unit III : Optimum Controller Settings**

Tuning of controllers by process reaction curve method - continuous cycling method, damped oscillation method - Ziegler - Nichol's tuning - 1/4 decay ratio - Feed Forward control - Ratio control - cascade control - averaging control - multivariable control.

## **Unit IV : I/P and P/I Converters**

Pneumatic and electric actuators - valve positioner - control valve - Characteristics of control valve - valve body - globe, butterfly, diaphragm ball valves - control valve sizing - Cavitation, flashing in control valves - Response of pneumatic transmission lines and valves.

## **Unit V : Applications**

Distillation column - control of top and bottom product compositions - reflux ratio - control of chemical reactor - control of heat exchangers - steam boiler - drum level control and combustion.

## **Text Books**

1. Curtis Johnson, D., " Process Control Instrumentation Technology" , Prentice Hall Of India,1996.
2. Eckman, D.P., " Automatic Process Control" , Wiley Eastern,1985.

## **Reference Books:**

1. Peter Harriot,: "Process Control" , TMH
2. Patranabis, D.,: " Principles of Process Control", TMH 1981.
3. Coughanoner, and Koppel., : " Process Systems Analysis and Control" , TMH 1991.

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

Semester : VI

Subject: **Power Electronic Devices & Applications**

Total Theory Periods: **40**

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

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

Branch: **E&/AE&I**

Code: **327612 (27)**

Total Tutorial Period - **12**

## **UNIT – I : Power Diodes**

Construction, Principle of Operation, characteristics, power diode types, series and parallel connected diodes, diode circuits and rectifiers- diodes with RC RL LC and RLC loads, three phase bridge.

## **UNIT – II : Thyristors**

Construction, Principle of Operation, characteristics, two-transistor model, turn on and turn off, thyristor types, firing circuits, Thyristor commutation techniques- natural and forced commutation- different types.

## **UNIT – III : Power Transistors**

Power BJT, Power MOSFET, SIT and IGBT, steady state and switching characteristics of BJT and Power MOS. drive requirements and design of simple drive circuits for power BJT, MOSFET and IGBT. Spice models of the power devices

## **UNIT – IV : Controlled Rectifiers**

Principle of phase controlled converter operation Single phase and three phase semi converters, full converters, and dual converters, power factor improvements, design of converter circuits, Effects of load and source inductances. AC voltage controllers- Principle of on-off and phase angle control, single phase controllers with resistive and inductive loads, three phase half wave and full wave controllers, cycloconverters

## **UNIT – V : Choppers**

DC choppers – principle of step down & step up operations – step down chopper with RL load, Class A, B, C, D & E choppers.

### **Text Books:**

1. Md. H.Rashid, *Power Electronics: Circuits, Devices and Applications 2nd edition*, Prentice Hall of India
2. 3. Jai P. Agrawal, *Power electronic Systems: Theory and Design*, Pearson Education

### **References:**

1. Michael Jacob, *Power Electronics Principle and Application, Thomson Delmar Series*
2. P.C Sen. *Modern Power Electronics*, Wheeler Publishers.

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

Semester : VI

Subject: **Industrial Instrumentation – II**

Total Theory Periods: **40**

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

Minimum number of Class tests to be conducted: **2**

Branch: **E&I/AE&I**

Code: **327613 (27)**

Total Tutorial Periods: **12**

## **UNIT I :- FREQUENCY MEASUREMENT**

Spectral Analysis; Superheterodyne Frequency analysis; multi-filter Real – time spectrum Analysis tracking Generator circuit; Techniques of Application of Analysis; choice of Bandwidth; Electronics techniques of frequency measurement; Direct reading counters.

## **UNIT II :- HIGH FREQUENCY POWER MEASUREMENT**

Bolo meter method; colorimeter method; power measurement & monitoring using Directional couplers.

## **UNIT III :- VOLTAGE & CURRENT MEASUREMENT**

Digital voltmeters – Non integrating type, using counting circuitry; Normal & common mode rejection; principles of A.C. voltage measurement, Average & peak responding detectors, peak to peak responding detectors; root mean square responding Detectors, other methods of detectors; sampling voltmeters; synchronous detector; DC & AC probes.

## **UNIT IV :- ANALOG TO DIGITAL & DIGITAL TO ANALOG DATA CONVERTERS**

Simultaneous A/D Converter, Stair step – Ramp type A/D converter, signal slope A/D converter, Dual slope A/D converter, SAR ( Successive Approximation ) type A/D converter, Weighted – Resistor D/A converter, Ladder type D/A converter.

## **UNIT V :- DIGITAL INSTRUMENTS**

Digital Transducer, Digital Multimeters, Digital frequency meter, Universal Counter, Decode counter, Electronic Counter, Digital measurement of frequency, Digital Tachometer, Digital P- H meter, Automation in Digital Instruments, Digital phase meter, Digital capacitance meter, microprocessor based instruments, IEEE 488 Bus .

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

1. Carr, "Elements of Electronic Instrumentation & measurement", 3<sup>rd</sup> ed, Person Education.
2. H.S. Kalsi "Electronic Instrumentation" second Edition, Tata McGraw Hill Publishing company Ltd., New Delhi .

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

1. Oliver cage, "Electronic measurement & Instrumentation" McGraw Hill international.
2. Shawney A.K., "Measurement & Measuring Instrument", Dhanpat Rai & Co.

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

Semester : **VI**  
Subject: **Digital Signal Processing**  
Total Theory Periods: **40**  
Total Marks in End Semester Examination: **80**  
Minimum number of Class tests to be conducted: **Two**

Branch: **E&I/AE&I**  
Code: **327614 (27)**  
Total Tutorial Periods: **12**

## **UNIT I : Introduction**

Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems. DISCRETE FOURIER SERIES: Properties of discrete Fourier series, DFS representation of periodic sequences,

Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT.

FAST FOURIER TRANSFORMS: Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency, FFT Algorithms, Inverse FFT, FFT with General Radix.

## **UNIT II : Realization of Digital Filters**

Applications of z-transforms, solution of difference equations of digital filters. System function, stability criterion, frequency response of stable systems. Realization of digital filters – direct, canonic, cascade and parallel forms, Lattice structures.

## **UNIT III : IIR Digital Filters**

Analog filter approximations – Butter worth and Chebshev, Design of IIR Digital filters from analog filters, Bilinear transformation method, step and impulse invariance techniques, Spectral transformations.

## **UNIT IV: FIR Digital Filters**

Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

## **UNIT V: Applications of Digital Signal Processing**

Introduction, Applications of DSP: Digital Sinusoidal Oscillators, Digital Time Control Circuits, Digital Comb Filters.

Applications in broader sense: Removal of noise from pictures, Applications of DSP to Radar, Applications of DSP in Image Processing, Applications of DSP in speech processing.

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

1. Digital Signal Processing, J. Johnson, Pearson - PHI
2. Digital Signal Processing, Proakis, Manolakis & Sharma, Pearson Education

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

1. Digital Signal Processing, Nair, PHI
2. Discrete Time Signal Processing, Oppenheim & Schafer, Pearson - PHI
3. Digital Signal Processing, Vallavaraj, Salivahanan, Gnanapriya, TMH
4. Digital Signal Processing by Hussain, Umesh Publications.

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

**Semester : VI**

**Subject: Advanced Microprocessors & Interfacing**

**Total Theory Periods: 40**

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

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

**Branch: ET&T/AEI/EI/EEE**

**Code: 328613 (28)**

**Total Tutorial Periods: 12**

## **Unit – I**

**Architecture & Instruction set for 8086:** Architecture and pin configuration of 8086, Instruction Format; Addressing modes, Data Transfer Instruction; Arithmetic Instructions; Branching and Looping Instructions, NOP and Halt, Flag Manipulation Instructions; Logical, Shift and Rotate Instruction. Byte and String Manipulation: String Instructions; REP Prefix, Table Translation, Number Format conversions. Assembler Directives and Operators; Assembly Process; Translation of assembler Instructions. Programming of microprocessor 8086

## **Unit – II**

**System Bus Structure:** Basic 8086/8088 system bus architecture, Minimum mode Configuration, Maximum mode configuration; memory interfacing with 8086/8088 in minimum and maximum mode; System Bus Timings, Bus Standards. Interrupts of microprocessor 8086

## **Unit – III**

**Architecture of Interfacing Devices:** Programmable interrupt controller (PIC) 8259, Programmable DMA Controller (8257). (*Architecture and Functioning only*) 8-bit ADC and DAC, Programming for Interfacing of 8253/8254, 8251, 8279, ADC and DAC with 8086.

## **Unit – IV**

**Architecture of 32 bit Microprocessors:** Intel 80386 Architecture –Special 80386 Registers –Memory management – interrupts and exceptions – management of tasks –Real, protected and virtual 8086 mode-Introduction to 80486 microprocessor – Architecture – Comparison with 80386 processor. Introduction to RISC and CISC Processor

## **Unit – V**

**Multiprocessor Architecture & Programming:** Numeric data Processor 8087; I/O Processor 8089, Communication between CPU and IOP, Related Instructions; programming of 8087 numeric data processor.

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

1. Microcomputer Systems: 8086/8088 Family - Architecture, Programming, and Design; Y. Liu and G. A. Gibson, 2<sup>nd</sup> Ed., PHI.
2. Microprocessor & Interfacing – D. Hall, TMH

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

1. The 8086 Microprocessor: Programming & Interfacing the PC, Kenneth J. Ayala, Penram International Publishing (India).
2. The Intel 8086/8088 Microprocessor Architecture, Programming Design & Interfacing – B.S. Chhabra, Dhanpat Rai Publishing Company.
3. The Intel Microprocessor 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium & Pentium Pro Processor: Architecture, Programming & Interfacing – Brey & Sharma, Pearson Education.
4. Advanced microprocessor, Rajasree, New Age International Publishers

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

Semester : **VI**

Subject: **Process Control Instrumentation**

Total Theory Periods: **40**

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

Minimum number of Class tests to be conducted: **2**

Branch: **E&/AE&I**

Code: **327631 (27)**

Total Tutorial Periods: **nil**

## **Unit I : Process Characteristics**

Dynamic elements in control loops , Dead time, process capacity and multi-capacity processes, interaction, Gain and its dependence .

## **Unit II : Analysis of Some Common Loops**

Flow, Pressure, Level, temperature, composition and PH Linear & nonlinear controllers, their tuning methods control values and their selection.

## **Unit III : Multiloop Systems**

Definition & applications of feedback control , cascade control, ratio control, selective control, Adaptive & feed forward control.

## **Unit IV : Multivariable Process Control**

Choosing controlled variables, pairing controlled & manipulated variable, coupling & Decoupling control systems. Typical Process controls: control of compressors, Pump heat exchangers, Furnaces, Distillation columns, steam Boilers.

## **Unit V : Process Instrumentation**

Introduction to instrumentation for Petroleum and petrochemicals, Paper & pulp, fertilizers polymerization industries.

### **Text Book:**

1. F.C. Shin sky, "Process control system".

### **Reference:**

1. Harriot, "Process control".
2. Liptack, "Instrument Engineer's Handbook (process control)".
3. Andrews, "Applied instrumentation in process industries".

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

Semester : **VI**  
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: **E&I/AE&I**  
Code: **327632 (27)**  
Total Tutorial Periods: **nil**

## **Unit – I : BASIC DEVICE CHARACTERISTICS**

NMOS, PMOS and CMOS devices characteristics, linear, saturation modes, bulk effect capacitance, device models for simulation. CMOS device fabrication principles.

## **Unit – II : BASIC CIRCUITS DIGITAL SYSTEMS**

CMOS Inverter Design principles – Design Layout rules. Construction of multiplexers, transmission gates, latches, flip flops, Timing and fan-out considerations.

## **Unit – III : BUILDING BLOCKS OF DIGITAL SYSTEMS**

Combinational Logic and Sequential logic circuits, Data path circuits, Adder multiplier architecture and accumulators.

## **Unit – IV : PROGRAMMABLE LOGIC DEVICES AND FPGAS**

Programmable Logic interconnect principles and types, Programmable logic elements and AND-OR arrays, Routing Procedures in FPGAs and CPLD, programming methods for FPGAs and CPLDs, Comparison of ACTEL, Altera And Xilinx FPGAs.

## **Unit – V : PRINCIPLES OF HDL**

Introduction to VHDL – sequential and concurrent descriptions. Signal, port and variable statements. Wait, case and other sequential statements. Block, process component and generate descriptions. Test branch creation and principles of operation of VHDL simulator. Introduction to Verilog and brief comparison with VHDL.

### **List of Text Books:**

1. Rabey, J.M., Digital Integrated Circuits: A Design Perspective, Prentice Hall, 1955
2. Stephen Brown and Zvonko Vranesic, Fundamentals of Digital Logic with VHDL Design, Tata McGraw-Hill, New Delhi

### **List of Reference books:**

1. Smith, M.J., Application Specific Integrated Circuits Addison Wesley Press, 1999
2. Weste, N.H.E, and Ershingian, K., Principles of CMOS VLSI Design: A Design Perspective, Addison Wesley, 1996
3. Chales H Roth Jr., Digital System Design using VHDL, Thomson Asia Pte. Bhasker, J., VHDL Primer, Prentice Hall 1995

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

Semester : VI

Subject: **Telecommunication Switching & Computer Network**

Total Theory Periods: 40

Total Marks in End Semester Examination: 80

Minimum number of Class tests to be conducted: 2

Branch: **E&I/AE&I**

Code: **327633 (27)**

## **Unit I Introduction**

Perspective of Network. Protocols and Standards, Switching Paradigm: Circuit Switched, Message Switched And Packet Switched. Asynchronous And Synchronous Transmission. Line Configuration, Network Topologies, Link Configuration, Transmission Modes, Categories Of Networks, The Osi Model, Functions Of The Layers, TCP/IP Protocol Suite.

Multiplexing: Review of SDM, FDM, TDM AND WDM.

## **Unit II Physical & Data Link Layer:**

V.24/Eia 232, Standard Dte-Dce Interface, Null Modem, Modem Standards, Physical Media, Data Link Layer: Flow Control, Stop & Wait, Sliding Window, Error Control: Basics of Cyclic Redundancy Check (CRC), Arq, Stop & Wait Arq, Sliding Window Arq, HDLC, Brief Details of Other Data Link Control Protocols.

## **Unit III Local Area Network**

Ieee 802.1, Llc, Mac, Pdu; Ethernet: Access Method: Cdma/Cd, Addressing, Electrical Specification, Frame Format, Implementation, Switched Ethernet, Fast Ethernet, Gigabit Ethernet; Token Bus; Token Ring: Access Methods: Token Passing, Addressing, Electrical Specification, Frame Format, Implementation; Fddi: Access Methods: Token Passing, Addressing, Electrical Specification, Frame Format, Implementation: Physical Medium Dependent (Pmd) Layer, Wireless LAN-IEEE 802.11, Comparison.

## **Unit IV Telecom Switching Networks:**

Evolution Of Telecommunication, Basics Of Switching Systems, Basics Of Strowger Switching System, Design Of Switching System, Basics Of Telephone Speech Digitization, Electronics Space Division Switching: Space Switch, Time Switch, Combinational Switching: Two Stage, Three Stage & NStage Combinational Switching, Networks Traffic Load & Parameter, Grade Of Service, Blocking Probability, Subscriber Loop System, Switching Hierarchies & Routing, Numbering Plan.

## **Unit V Other OSI Layers**

Review of OSI: Standardization Within OSI Framework, The OSI Layers: Network Layer, Transport Layer, Session Layer, Presentation Layer, Application Layer; TCP/IP Protocol Suite: The TCP/IP Approach; Principles Of Internetworking: Architectural Approaches, Connection Mode Operation; Internet Protocol: IP Addresses, Transport Services: Type of Service, Protocol Mechanism; TCP: TCP Services, TCP Header Format.

## **Text Books:**

1. Forouzan B.A., "Data Communication And Computer Networking", Tata Mcgraw Hill, 2<sup>nd</sup> Edition.

## **Reference Books**

2. Stalling William., "Data And Computer Communications", PHI.
3. Vishwanathan Thiagarajan, "Telecommunication Switching Systems And Networks", PHI.

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

Semester : **VI**

Subject: **Audio and Video Engineering**

Total Theory Periods: **40**

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

Minimum number of Class tests to be conducted: **2**

Branch: **E&/AE&I**

Code: **327634 (27)**

Total Tutorial Periods: **nil**

## **UNIT – I : Audio Systems**

Input types of microphones and speakers. Monophonic, stereophonic and quadraphonic audio systems.

## **UNIT – II : Magnetic Disc Recording and Reproduction:**

Monophonic and stereophonic disc recording and reproducing, Recording systems. Magnetic recording & playback Biasing & equalization, Recording medium, Magnetic heads record, replay & erase heads, Audio cassettes, Tape speed, Maximum usable frequency, Tape transport mechanism, Distortion & noise aspects. HI-FI stereo system.

## **UNIT – III : Video Cassette Recorders**

Video recording requirements. Video tape formats. Modulation-up conversion and down conversion of video signal, Servo systems, Functional Block, Functional Block diagram of VCR Video disc recording & playback.

## **UNIT – IV : Compact Disc Recording and Reproduction**

Compact disc advantages, Specifications, CD player optical requirements. CD technology & manufacturing, CD ROM, CD Video. Introduction to DVD technology.

## **UNIT – V : Television Engineering**

Scanning process, interlaced scanning, Composite video signals, Principle of black & white TV & color TV receivers, Primary colours, Chrominance & Luminance signals. Colour TV Systems-NTSC SECAM, PAL, Transmission & reception using PAL systems.

### **Text Books:**

1. S.P. Bali & R. Bali, Audio Video System, Khanna Book Publishing Co., Delhi.
2. Ajay Sharma, Audio and Video Systems, Dhanpat Rai & Co.

### **Reference Books:**

1. S.P. Bali, Consumer Electronics, Pearson Education
2. R.G. Gupta-Audio and Video Systems, Tata Mc-Graw Hill.

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

Semester : VI

Subject: **High Frequency Electronics**

Total Theory Periods: **40**

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

Minimum number of Class tests to be conducted: **2**

Branch: **E&I/AE&I**

Code: **327635 (27)**

Total Tutorial Periods: **nil**

## **UNIT – I : Electromagnetic & Transmission Lines**

Elements of vector calculus: Gradient, divergence and Curl; Gauss and Stokes theorems, Maxwell's equations, Differential and Integral forms. Wave equations, Poynting vector.

General transmission line equations SWR. Transmission lines at audio and radio frequencies. Transmission equalizers. Characteristics of quarter wave, half wave and other lengths. Smith chart and its applications. Transmission line applications. Stub-matching.

## **UNIT – II : High Frequency Devices**

High frequency transistors and their equivalent circuit analysis Microwave semiconductor devices. Klystron, Magnetron and TWT. Microwave Instrumentation in Air-Traffic Control.

## **UNIT – III : Coupling Circuits and Impedance Matching Networks**

Resistive, capacitive, inductive, mutual inductive and combination type for R.F. couplings single and double tuned couplings. Effect of loose, tight and optimum couplings, load conditions and Q. Various impedance matching networks for low and high impedance loads. Balanced-to unbalanced network.

## **UNIT – IV : RF Voltage Amplifiers**

Theory, operation, performance and design of R.C. coupled and transformer coupled single and double tuned amplifiers using JFET's MOSFETs & BJTs. Time and frequency domain analysis Synchronously tuned multistage amplifiers. Stagger tuned, stagger damped circuits. Neutralization circuits. Cascode amplifiers. Integrated circuit frequency selective R.F. and IF amplifiers.

## **UNIT – V : RF Power Amplifiers**

Special features of R.F. power devices. Theory and design and tuned class C amplifiers using VTs, BJTs, JFETs and MOSFETs. Graphical and approximate analysis methods of solution: Output circuit efficiency considerations Biasing circuits. Characteristics of driver and output circuit power supplies, Effect of input circuit distortion. Neutralization Parasitic oscillations. Class-C amplifiers, adjustments. Theory of frequency multipliers.

### **Text Books:**

1. Electromagnetic Field Theory and Transmission Lines Networks, Raju, 2<sup>nd</sup> Ed., Pearson Education.
2. Microwave Devices and Circuits by Samuel Y. Liao, 3<sup>rd</sup> Ed., Pearson Education

### **Reference Books:**

1. Network, Lines and Fields, Ryder, 2<sup>nd</sup> Ed., PHI
2. Engineering Electromagnetism, Hayt, 7<sup>th</sup> Ed., TMH
3. Microwave Semiconductor Devices, Roy & Mitra, PHI
4. Microwaves, Gupta, New Age International Publishers
5. D. M. Pozar: *Microwave Engineering*, John Wiley, 1998, 2/e.
6. G. D. Vendelin, A. M. Pavio and U. L. Rohde: *Microwave Circuit Design*, John Wiley, 1990.
7. Guillermo Gonzalez, *Microwave Transistor Amplifiers: Analysis and Design* (2nd Edition), Prentice Hall, 2000

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

Semester : **VI**  
Subject: **AI & Expert Systems**  
Total Theory Periods: **40**  
Total Marks in End Semester Examination: **80**  
Minimum number of Class tests to be conducted: **Two**

Branch: **E&I/AE&I**  
Code: **327636 (27)**  
Total Tutorial Periods: **nil**

## **UNIT – I : Introduction**

Overview of AI -general concepts -problem spaces and search – search techniques – BFS, DFS-Heuristic search techniques.

## **UNIT – II : Knowledge Representation**

Knowledge – general concepts - predicate logic - representing simple fact - instance and ISA relationships – resolution – natural deduction.

## **UNIT – III : Knowledge Organization and Manipulation**

Procedural Vs declaration knowledge – forward Vs backward reasoning – matching techniques – control knowledge/strategies – symbol reasoning under uncertainty – introduction to non – monotonic reasoning – logic for monotonic reasoning.

## **UNIT – IV : Reception – Communication and Expert Systems**

Natural language processing – pattern recognition – visual image understanding – expert system architecture

## **UNIT – V : Knowledge Acquisition**

Knowledge acquisition – general concepts – learning – learning by induction – explanation based learning.

### ***Text Books:***

1. Elaine Rich and Kelvin Knight, Artificial Intelligence, Tata McGraw-Hill, New Delhi, 1991.
2. Stuart Russell and Peter Norvig, Artificial Intelligence: A modern approach. Prentice Hal, 1995

### ***Reference Books:***

1. Nilson N.J. Principles of Artificial Intelligence, Springer Verlag, Berlin, 1980.
2. Patterson, Introduction to Artificial Intelligence and Expert systems, Prentice Hall of India, New Delhi, 1990.

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

Semester : **VI**  
Subject: **Industrial Instrumentation Laboratory - II**  
Total Practical Periods: **28**  
Total Marks in End Semester Examination: **40**

Branch: **E&I/AE&I**  
Code: **327621 (27)**

**Experiments to be performed:**

1. Study of LVDT & displacement measurement
2. Study the Characteristics of strain guage & Measurement of force
3. Study of electromagnetic flow meter
4. Study of hot wire anemometer
5. Study the characteristics of NTC, Thermistor
6. Study of Platinum RDT and draw its characteristics
7. Study of R-type and K-type thermocouple
8. Study of IC temperature Sensor (LM 335)
9. Study the characteristics of photo voltaic cell.
10. Study of characteristics of photo-conductive cell.
11. Discharge coefficient of orifice plate
12. Torque measurement
13. Viscosity measurement
14. Vacuum pressure measurement
15. pH meter standardisation and measurement of pH values of solutions

**List of Equipments/Machine Required:**

Discrete Components, Function Generator, Power Supply, CRO, AVO Meter, Multimeter, Voltmeter

**Recommended Books:**

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

Semester : VI

Subject: **Advanced Microprocessor & Interfacing Lab**

Total Practical Periods: **50**

Total Marks in End Semester Examination: **40**

Branch: **E&I/ AE&I**

Code: **327622 (27)**

## List of Experiments to be performed:

- ⚡⚡ To write a program to perform subtraction X-Y where X and Y are 48 bit numbers.
- ⚡⚡ To write a program to multiply 4 and 5 in ASCII and store the result.
- ⚡⚡ To find the largest number from a block of 15 bytes
- ⚡⚡ To find the smallest number from a block of 15 bytes
- ⚡⚡ To write a program to add series of 20 bytes.
- ⚡⚡ A block of 200-signed bytes is present in memory from address BA: EA add all the positive bytes and store 8 bit signed result in memory after this block.
- ⚡⚡ To write a program to compare two data blocks.
- ⚡⚡ To write a program to scan for a specific word in the block and to store the location of the word at a suitable memory location.
- ⚡⚡ To write an assembly language program to solve following arithmetic equation:  $3AX+5DX+BP$ .
- ⚡⚡ To write a program to arrange a data block in ascending order.
- ⚡⚡ To write a program to arrange a data block in descending order.
- ⚡⚡ To write a program to convert an 8-bit BCD number into its equivalent binary.
- ⚡⚡ To write a program to insert a specific data byte under certain given conditions.
- ⚡⚡ To write program to input a 4 bit BCD number, look up the seven segment code for this number and output to the display.
- ⚡⚡ To write a program to count the number of odd and even bytes in a data block.

## List of Equipments/Machine Required:

8086 Microprocessor kit, Keyboard, Assembler, PCs.

## Recommended Books:

The Intel 8086/8088 Microprocessor Architecture, Programming, Design and Interfacing – Bhupinder Singh  
Chhabra, Dhanpat Rai Publications.

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

Semester : VI

Subject: **Digital Signal Processing Lab**

Total Practical Periods: **50**

Total Marks in End Semester Examination: **40**

Branch: **E&I/ AE&I**

Code: **327623 (27)**

## List of Experiments to be performed:

- ❏ To generate Analog Signals.
- ❏ To generate discrete sequences
- ❏ To sample a sinusoidal signal at Nyquist rate
- ❏ To convolve two given signals
- ❏ To correlate two given signals
- ❏ To design LPF using recursive structures
- ❏ To design HPF using recursive structure
- ❏ To design BPF using recursive structure
- ❏ To design BSF using recursive structure
- ❏ To design LPF using non-recursive structures
- ❏ To design HPF using non-recursive structure
- ❏ To design BPF using non-recursive structure
- ❏ To design BSF using non-recursive structure
- ❏ To design a digital notch filter and embed it on a digital signal processor block
- ❏ Experimentation with application of DSP in Communication/Speech Processing/Image Processing  
*(Institutes may append more programmes/Experiments based on the infrastructure available)*

## List of Equipments/Machine Required:

C++ Compiler, MATLAB with Tool boxes, DSP Processor kit, Digital Storage CRO, Spectrum Analyzer.

## Recommended Books:

1. Digital Signal Processing, Vallavaraj, Salivahanan, Gnanapriya, TMH

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

Semester : VI

Subject: **Power Electronics Devices & Applications- Lab**

Total Practical Periods: **50**

Total Marks in End Semester Examination: **40**

Branch: **E&I / AE&I**

Code: **327625 (27)**

## **Experiments to be performed:**

- ✂✂ Introduction to PCB
- ✂✂ Design of PCB
- ✂✂ Fabrication of PCB using Copper clad
- ✂✂ Fabrication of PCB on Glass Epoxy Board
- ✂✂ Fabrication of double sided PCB
- ✂✂ Fabrication of Multilayer PCB
- ✂✂ Testing of PCB
- ✂✂ Winding of RF Choke
- ✂✂ Winding of Transformer for power supply
- ✂✂ Winding of pulse transformer
- ✂✂ Design, fabrication and testing of Power supplies.
- ✂✂ Design, fabrication and testing of low frequency amplifier using transistor
- ✂✂ Design, fabrication and testing of high frequency amplifier using transistor
- ✂✂ Design, fabrication and testing of multi-stage amplifier using transistor
- ✂✂ Design, fabrication and testing of variable frequency oscillator using transistor
- ✂✂ Study and operation of VCR
- ✂✂ Study and operation of Video Camera.

*(Institutes may append more programmes/Experiments based on the infrastructure available)*

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

PCB design software, PCB Fabrication unit, Discrete components, Transformer winding machine etc..

## **Recommended Books:**

1. Manuals of the instruments

# *Chhattisgarh Swami Vivekanand Technical University, Bilai (C.G.)*

Semester: VI  
Subject: Managerial Skills  
Total Practical Periods: 28  
Total Marks in End Semester Exam: Nil  
Minimum number of class test to be conducted: 2

Branch: Common to all Branches  
Code: 300625 (36)  
Total Tut Periods: NIL

## **Unit-I**

Managerial Communication Skills: Importance of Business Writing: writing business letters, memorandum, minutes, and reports- informal and formal, legal aspects of business communication, oral communication- presentation, conversation skills, negotiations, and listening skills, how to structure speech and presentation, body language.

## **Unit-II**

Managerial skills: Leadership: Characteristics of leader, how to develop leadership; ethics and values of leadership, leaders who make difference, conduct of meetings, small group communications and Brain storming, Decision making, How to make right decision, Conflicts and cooperation, Dissatisfaction: Making them productive.

## **Unit-III**

Proactive Manager: How to become the real you: The journey of self-discovery, the path of self-discovery, Assertiveness: A skill to develop, Hero or developer, Difference between manager and leader, Managerial skill check list, team development, How to teach and train, time management, Stress management, Self assessment.

## **Unit-IV**

Attitudinal Change: Meaning of attitude through example, benefits of positive attitude, how to develop habit of positive thinking, what is fear? How to win it? How to win over failure? How to overcome criticism? How to become real you? How to Motivate?

## **Unit-V**

Creativity – a managerial skill, Trying to get a grip on creativity.  
Overview of Management Concepts: Function of Management: Planning, organizing, staffing, controlling.

### **Text & Reference Books:**

1. Basic Managerial skills for all by E.H. McGrawth, Prentice Hall India Pvt Ltd,2006
2. How to develop a pleasing personality by Atul John Rego, Better yourself books, Mumbai, 2006
3. The powerful Personality by Dr. Ujjawal Patni & Dr. Pratap Deshmukh, Fusion Books, 2006
4. How to Success by Brian Adams, Better Yourself books, Mumbai, 1969