

PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2021-22 onwards)*

Programme: Bachelor of Technology

Semester –III

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBEC-301	Computer System Organization	3	1	-						

Duration of Theory (Externals): 3 Hours

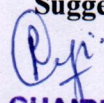
Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance /Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	This course covers the internal structure of computers, machine (assembly) language programming, and the use of pointers in high-level languages.
Course Outcome	Student will be able to learn: 1. Basics of computer. 2. CPU and ALU organization.. 3. Memory organization and all types of memory in computer system. 4. Input Output Organization 5. Multiprocessors & Interconnection structure and inter-processor communication.

Unit	Contents (Theory)	Marks Weightage
I	Computer Basics and CPU: Von Newman model, various subsystems, CPU, Memory, I/O, System Bus, CPU and Memory registers, Program Counter, Accumulator, Instruction register, Micro operations, Register Transfer Language, Instruction Fetch, decode and execution, data movement and manipulation, Instruction formats and addressing modes of basic computer. 8085 microprocessor organization.	14
II	Control Unit Organization: Hardwired control unit, Micro and nano programmed control unit, Control Memory, Address Sequencing, Micro Instruction formats, Micro program sequencer, Microprogramming, Arithmetic and Logic Unit: Arithmetic Processor, Addition, subtraction, multiplication and division, Floating point and decimal arithmetic and arithmetic units, design of arithmetic unit.	14
III	Input Output Organization: Modes of data transfer – program controlled, interrupt driven and direct memory access, Interrupt structures, I/O Interface, Asynchronous data transfer, I/O processor, 8085 I/O structure, 8085 instruction set and basic programming. Data transfer – Serial / parallel, synchronous/asynchronous, simplex/half duplex and full duplex.	14
IV	Memory Organization: Memory Maps, Memory Hierarchy, Cache Memory - Organization and mappings. Associative memory, Virtual memory, Memory Management Hardware.	14
V	Multiprocessors: Pipeline and Vector processing, Instruction and arithmetic pipelines, Vector and array processors, Interconnection structure and inter-processor communication.	14

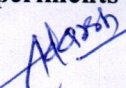
Text Book/References Books/ Websites:-

1. Morris Mano; Computer System Architecture; PHI.
2. Gaonkar; Microprocessor Architecture, Programming, Applications with 8085; Penram Int.
3. William Stallings; Computer Organization and Architecture; PHI.

Suggested List of Laboratory Experiments :- (Expandable): Nil


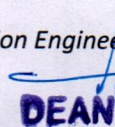
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Department: Electronics & Communication Engineering

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Programme: Bachelor of Technology

Semester –III

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBEC-302	Control System	3	1	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance / Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	To understand concepts of the mathematical modeling, feedback control and stability analysis in Time and Frequency domains.
Course Outcome	Student will be able to learn: 1. The terminology and classification of control system. 2. Time Response Analysis of different order system. 3. How systems are design and compensation techniques. 4. The concept of state, state variable and state models. 5. Concept of Stability of Linear Systems.

Unit	Contents (Theory)	Marks Weightage
I	Basic Control System: Terminology and Classification of control System, Examples of control System, Transfer Function of Linear Control System, Block Diagram Representation, Signal flow Graph Techniques. Mathematical Modeling of Electrical Network: AC and DC Servomotors, Error Detector, Stepper Motor, Optical Encoder, Linearization.	14
II	Sensitivity of control Systems: Effects of Feedback on gain and time constant, pole location, bandwidth, Sensitivity, Stability, and Disturbance signal, Control over System Dynamics by use of Feedback. Time Response Analysis- Standard Test Signals, Time Response of 1st Order System, Model of Prototype DC Position Control System, Time Response of Prototype 2nd Order System, Performance Specification of 2nd Order System, Steady-State Errors and Error Constants, Effects of Additions of Poles and Zeros to Open Loop and Closed Loop System, Design Specification of 2 nd Order System and Higher-Order System, Performance Indices, Optimal Control System.	14
III	Time Domain Stability Analysis: Concept of Stability of Linear Systems, Effects of Location of Poles on Stability, Necessary Conditions for Stability, Routh-Hurwitz Stability Criteria, Relative Stability Analysis, Root Locus Concept, Guidelines for Sketching Root-Locus, Frequency Domain Stability Analysis- Performance Specification in Frequency Domain, Correlation between frequency Domain and Time Domain, Bode Plot, Minimum-Phase and Non-Minimum Phase System, Polar Plots, Inverse Polar Plot, Nyquist Stability Criterion, Assessment of Relative Stability (Phase Margin, Gain Margin and Stability), Constant-M and N Circle, Nichols Chart.	14
IV	Approaches to System Design: Types of Compensation, Design of Phase-Lag, Phase Lead and Phase Lead-Lag Compensators in Time and Frequency Domain, Proportional, Derivative, Integral and PID Compensation.	14
V	Concept of State, State Variables and State Model: State Space Representation of Systems, Block Diagram for State Equation, Transfer Function Decomposition, Solution of State Equation, Transfer Matrix, Relationship between State Equation and Transfer Function, Controllability and Observability.	14

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Programme: **Bachelor of Technology**

Semester –III

Text Book/References Books/ Websites:

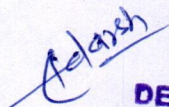
1. Nagrath and Gopal; Control System Engineering; New Age International Publishers.
2. Samarjit Ghose; Control Systems Theory and Applications; Pearson Education
3. Distefano; Feedback and Control System (Schaum); TMH
4. B. S. Manke ; Linear Control System (with MATLAB Application); Khanna Publishers.
5. Ogata; Modern Control Engineering; PHI

Suggested List of Laboratory Experiments :- (Expandable): Nil



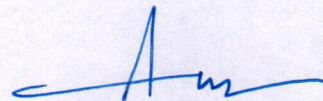
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Semester –III

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBEC-303	Electronic Devices	3	1	1						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance –Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance /Attendance / Quiz - Max. Marks: 15	

Pre-Requisite	Basic knowledge of Physics.
Course Objective	This course provides the student with the fundamental skills to understand the basic of semiconductor and components like diode, transistor, FET, MOSFET and operational amplifier.
Course Outcome	Student will be able to learn: 1. The working of diodes, transistors. 2. Optoelectronic and Miscellaneous Devices 3. The application of different electronic devices and simple circuits.. 4. The theory and applications of thyristor. 5. Analysis of FET in various configurations and Equivalent Model.

Unit	Contents (Theory)	Marks Weightage
I	Semiconductor: Semiconductor intrinsic and extrinsic, p-type and n-type, energy band diagrams, majority and minority carrier, charge density in semiconductor, generation and recombination of charges, process of diffusion, diffusion and drift currents, Hall effects and its applications. p-n junction, depletion layer, potential barrier, electric field, forward and reverse biased junction, current components in p-n diode, current equation, V-I characteristics, cut in voltages of Si and Ge diode, transition and diffusion capacitance, power dissipation, p-n junction diode as rectifier, clipper and clamper.	14
II	Optoelectronic and Miscellaneous Devices: Characteristics, Equivalent Models and applications of Zener diode, Varactor diode, Schottky diode, Tunnel Diode, PIN diode, LED, photoconductor cells, photodiodes, solar cell, phototransistors, opto-couplers, thermistors, Seven segment displays.	14
III	Bipolar Junction Transistor: Construction, basic operation, current components, and equation. CB, CE and CC-configuration, input and output characteristics, Equivalent Model, Early effect, region of operation- active, cutoff and saturation region, Ebers-Moll model, power dissipation in transistor (P _{max} rating), Uni-junction Transistor (UJT) : Principle of operation, characteristics and Equivalent Model.	14
IV	FET Construction: Construction, n channel and p channel, characteristics, parameters, equivalent model and voltage gain, Enhancement and depletion MOSFET and its characteristics, analysis of FET in various configuration and Equivalent Model.	14
V	Thyristor Family: Silicon Controlled Rectifier, V-I Characteristics, Equivalent Model, Transistor Analogy, Turn-On and Turn-Off Mechanism, Series and Parallel Combination of SCR, Protection Circuits. Introduction to Diac, Triac, Power MOSFET, IGBT and GTO.	14

Text Book/References Books/ Websites:

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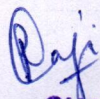
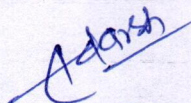
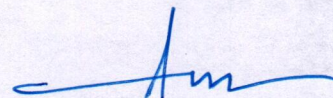
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PEOPLE'S UNIVERSITY, BHOPAL***(Applicable for Admitted from Academic Session 2021-22 onwards)*****Programme: Bachelor of Technology****Semester –III****Text Book/References Books/ Websites:**

1. Boylestad and Nashelsky : Electronic Devices and Circuit Theory; Pearson Education.
2. Millman and Halkias; Integrated electronics; TMH
3. Graham Bell; Electronic Devices and Circuits; PHI.
4. Sendra and Smith; Microelectronics; Oxford Press.

Suggested List of Laboratory Experiments :- (Expandable):

1. To Study the V-I Characteristics of Silicon Diode
2. To Study the V-I Characteristics of Germanium Diode
3. To Study the V-I Characteristics of Zener Diode
4. To Study the V-I Characteristics of Light Emitting Diode (LED)
5. To Study the V-I Characteristics of Tunnel Diode
6. To Study the V-I Characteristics of Photo Diode
7. To Study the V-I Characteristics of BJT
8. To Study the V-I Characteristics of MOSFET
9. To Study the V-I Characteristics of JFET
10. To Study the V-I Characteristics of Power Electronic Devices

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Programme: Bachelor of Technology

Semester –III

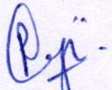
Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBEC-304	Network Analysis	3	1	1						

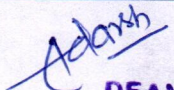
Duration of Theory (Externals): 3 Hours

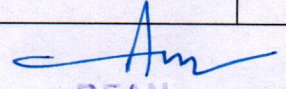
Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance / Attendance / Quiz - Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	To make the students capable of analyzing any given electrical network and to make the students learn how to synthesize an electrical network from a given impedance/admittance function.
Course Outcome	Student will be able to learn: 1. Basic circuit law and simplify the network using reduction techniques. 2. The circuit using Kirchhoff's law and Network simplification theorems. 3. Frequency domain analysis 4. The theory and applications of different waveforms. 5. Network & Transfer functions for one port & two ports.

Unit	Contents (Theory)	Marks Weightage
I	Introduction to Circuit Elements: R,L,C and their characteristics in terms of linearity & time dependant nature, voltage & current sources controlled & uncontrolled sources KCL and KVL analysis, Nodal & mesh analysis, analysis of magnetically coupled circuits, Transient analysis Transients in RL, RC&RLC Circuits, initial conditions, time constants. Steady state analysis-Concept of Phasor & vector, impedance & admittance, Network topology, concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks, Dot convention, coupling co-efficient, tuned circuits, Series & parallel resonance.	14
II	Network Theorems for AC & DC Circuits: Thevenin's & Norton's, Superposition's, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources.	14
III	Frequency Domain Analysis: Laplace transform solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain.	14
IV	Fourier Analysis: Concept of signal spectra, Fourier series co-efficient of a periodic waveform, symmetries as related to Fourier coefficients, Trigonometric & Exponential form of Fourier series.	14
V	Network Function & Two Port Networks: concept of complex frequency, Network & Transfer functions for one port & two ports, poles and zeros, Necessary condition for driving point & transfer function. Two port parameters – Z, Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters, Interconnection of two ports networks, Terminated two port networks.	14


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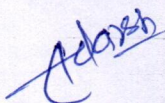
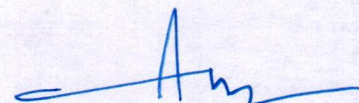
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1. M.E. Van Valkenburg; Network Analysis; PHI.
2. Mithal GK; Network Analysis; Khanna Publisher.
3. Hayt W.H. & J.E. Kemmerly; Engineering Circuit Analysis; TMH.
4. Roy Choudhary D; Network and systems; New Age Publication.
5. A.Chakraborti; Circuit theory; Dhanpat Rai Publication.

Suggested List of Laboratory Experiments :- (Expandable):

1. To verify Thevenin Theorem
2. To verify Superposition Theorem
3. To verify Reciprocity Theorem
4. To verify Maximum Power Transfer Theorem
5. To verify Millman's Theorem
6. To determine Open Circuit parameters of a Two Port Network
7. To determine Short Circuit parameters of a Two Port Network
8. To determine A,B,C,D parameters of a Two Port Network
9. To determine h parameters of a Two Port Network.
10. To find frequency Response of RLC Series Circuit.

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Programme: Bachelor of Technology

Semester –III

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBEC-305	Electronics Workshop	1	-	1						

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks: 15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance – Max. Marks: 5
Practical Internal Max Marks: 15	Lab Performance /Attendance / Quiz - Max. Marks: 15	

Pre-Requisite	Nil
Course objective	This course gives students deep knowledge in Core Electronic components and their specifications and creates interest in Hardware Technology.
Course Outcome	Student will be able to learn: 1. Identify and test various electronic components. 2. Assemble and test electronic circuits on boards. 3. Soldering & desoldering. 4. Design and fabrication of a single sided PCB. 5. Inter-connection methods.

Unit	Contents (Theory)	Marks Weightage
I	Familiarization/Identification of electronic components with specification (Functionality, type, size, colour coding, package, symbol, cost etc. [Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.]	07
II	Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, DSO etc.] [Soldering iron, Desoldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de-soldering station etc.]	07
III	Testing of electronic components [Resistor, Capacitor, Diode, Transistor and JFET using multimeter.]	07
IV	Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]	07
V	Inter-connection methods and soldering practice. [Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general purpose PCB, Crimping]	07

Text Book/References Books/ Websites:-

1. Stan Gibilisco; Electronics Workshop.
2. Albert Malvino. & David Bates.; . Electronic Principles; TMH.
3. Thomas Petruzzellis; Build your own Electronics Workshop; McGraw-Hill

Suggested List of Laboratory Experiments :- (Expandable):

1. Introduction to Electrical and Electronic workshop.
2. Solder different components such as resistor, capacitor, diodes and transistors on a PCB.
3. Practice to remove components /wires from PCB (Desoldering).
4. Testing electronic components (resistors, capacitors, diodes, transistors, transformers, relays).
5. Semiconductor Diodes. Setup DC Power Supply Circuit (9V or 12V or 15V).

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Semester –III

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (Nil)	Internal (50)	Total (50) Min: 20 (D Grade)
CBEC-306	C & C++ Programming	-	-	1						

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

Pre-Requisite	Students have basic knowledge of programming
Course objective	In this course, Students will learn the mechanics of editing and compiling programs in C & C++. Students will begin with a discussion of the essential elements of C & C++ programming: variables, loops, expressions, functions, and string class
Course Outcome	Student will be able to learn: 1. The concepts of inheritance and polymorphism. 2. Basic concepts of C++ programming. 3. To incorporate exception handling in object-oriented programs

Unit	Contents (Theory)	Marks Weightage
I	C language: Constants, Variables & Data Types: Character set, C Tokens, Identifiers and Keywords, Constants, Variables, Data types, Declaration of variables, assigning values to variables. Operators & Expressions, Branching & Looping, Arrays & its types, Function declaration, call by value and call by reference, recursive functions. Structures and Union, Pointer, pointers to functions. File Processing, input/output operations on files, Error handling during I/O operations. C++: Structure of a C++ program, conditional statement, control structure, switch-case, break, go to statements Pointers, Arrays, Strings, Structures. Introduction to OOPS, differences Between OOP and Procedure Oriented Programming. Function&Classes, Parameter passing, Dynamic memory allocation and reallocation, Class, Class Structure, Constructors and Destructors, Dynamic creation and destruction of objects, Data Abstraction, Inheritance, Different forms of inheritance, Defining the Base and Derived classes, Polymorphism, Function overloading, Operator Overloading, Virtual Function Polymorphism, C++ Exception Handling and File Handling, Comparison of C++ with C.	50

Text Book/References Books/Websites:

1. Let us C; Yashavant P. Kanetkar; BPB Publication
2. Programming in ANSI C; E. Balaguruswamy; McGraw Hill Education
3. ObjectOriented programming with C++; E. Balaguruswamy; TMH, 2001
4. YashwantPKanetkar; Let us C++ ; BPB Publication
5. RadhaGanesan; Object Oriented Programming with C++; Scitech Publication PVT.LTD.

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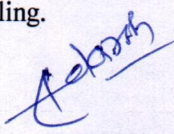
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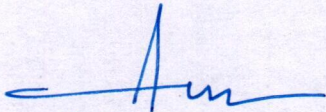
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PEOPLE'S UNIVERSITY, BHOPAL**(Applicable for Admitted from Academic Session 2021-22 onwards)****Programme: Bachelor of Technology****Semester –III****Suggested List of Laboratory Experiments :- (Expandable):**

1. Program to print any Message.
2. Program for Conditional Statements, Looping Statements and Switch Case.
3. Program to implement Arrays, Strings and Pointers.
4. Program to implement Functions and Dynamic Memory Allocation.
5. Program to implement Class and Objects.
6. Program to implement Friend Functions and Constructors.
7. Program for Inheritance.
8. Program for Polymorphism.
9. Program for File Handling.
10. Program for Exception Handling.


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CBTE-307	NCC-III	1	-	6						

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks:15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05
Practical Internal Max Marks: 15	Lab Performance/ Quiz/Attendance - Max. Marks: 15	

Pre-Requisite	Nil
Course objective	- Understand the life history and leadership qualities of great leaders, sportspersons & entrepreneurs. - Understand the various aspects of types of mindset. - Understand public speaking methods & qualities. - Understand the organizations related to disaster management and their functioning. - Understand the role of NCC cadets in disaster management. - Understand the various types of adventure activities. - Understand the History, Geography & Topography of Border/ Coastal Areas.
Course Outcome	Student will be able to learn: - Admire and get inspired from the accomplishments of leaders from various walks of life. - Develop public speaking skills. - Understand the importance of positive mindset and optimistic attitude in life. - Appreciate the need & requirement for disaster management and his role in disaster management activities. - Know the history & geographical peculiarity of our borders & coastal regions.

Unit	Contents (Theory)	Marks Weightage
I	Personality Development Group Discussions - Change your Mindset Public Speaking.	07
II	Leadership Development: Case Studies - APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murthy.	07
III	Disaster Management - Disaster Management Capsule. - Organization. - Types of Disasters. - Essential Services. - Assistance. - Civil Defence Organization.	07
IV	Adventure: Adventure activities.	07
V	Border & Coastal Areas: History, Geography & Topography of Border/ Coastal	07

Note: For NCC-III 05 credits will be allotted after successful completion of camp.

Text Book/References Books/ Websites:

- Cadet's handbook, NCC Directorate, MP, CG.
- Supplementary cadet's handbook, NCC Directorate, MP, CG.

Suggested List of Laboratory Practical (Expandable):

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PEOPLE'S UNIVERSITY, BHOPAL***(Applicable for Admitted from Academic Session 2021-22 onwards)*****Programme: Bachelor of Technology****Semester –III****1. Drill**

- Arm Drill.
- Rifle ke saath Savdhan, Vishram aur Aram se.
- Rifle ke saath Parade Par aur Saj, Rifle ke saath Visarjan, Line Tod.
- Bhumi Shastra aur Uthao Shastra, Bagal Shastra aur Baju Shastra.

2. Weapon Training

- Short Range firing.

3. Map Reading

- Setting of Map.
- Findings North and Own Position.

4. Field Craft & Battle Craft

- Observation.
- Camouflage.
- Concealment.

5. Social Service and Community Development

Cadets will participate in various activities throughout the semester e.g., Blood donation Camp, Swachhata Abhiyan, Constitution Day, Jan Jeevan Hariyali Abhiyan, Beti Bachao Beti Padhao etc as per the requirement and similar announced days- National and State level.

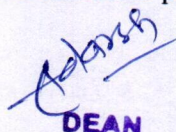
6. Obstacle Training

- Obstacle training - Introduction, Safety-measures, Benefits.
- Obstacle Course- Straight balance, Clear Jump, Gate Vault, Zig- Zag Balance, High Wall

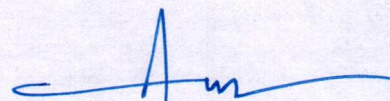
Note: Examination of this NCC course will be conducted as per NCC head quarter norms in consultation with office of COE, PU.


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PEOPLE'S UNIVERSITY, BHOPAL**(Applicable for Admitted from Academic Session 2021-22 onwards)**

Programme: Bachelor of Technology

Semester –III

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBTE-308	Introduction to Internet of Things	2	-	1						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance / Attendance / Quiz - Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	Internet of Things is a course that deals with the study of how devices are connected and how it helps to stay connected over the Internet. The course teaches the individuals on how the Internet of Things is helpful in our daily lives and how to stay connected over the Internet.
Course Outcome	Student will be able to learn: 1. Fundamental of Internet of Things and its technology. 2. Recognize the factors that contributed to the emergence of IoT. 3. Design and program IoT devices. 4. Use real IoT protocols for communication. 5. Security elements of an IoT device.

Unit	Contents (Theory)	Marks Weightage
I	IoT - What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues.	14
II	IoT Protocols - Protocol Standardization for IoT – Efforts – M2M , WSN Protocols SCADA and RFID Protocols ,Issues with IoT Standardization – Unified Data Standards Protocols – IEEE802.15.4,BACNet Protocol– Modbus ,KNX , Zigbee, Network layer , APS layer – Security.	14
III	IoT Architecture - IoT Open source architecture (OIC) - OIC Architecture & Design Principles- IoT Devices and deployment models- IoTivity: An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction.	14
IV	Web of Things - Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence.	14
V	IoT Applications - IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, IoT- A, Hydra etc.	14

Text Book/References Books/ Websites:

1. Arshdeep Bahga, Vijay Madisetti; Internet of Things (A Hands-on Approach); University Press.
2. Raj Kamal; Internet of things- Architecture and Design Principles; McGraw Hill
3. Cuno Pfister; Getting Started with the Internet of Things; O'Reilly Media
4. Francis daCosta; Rethinking the Internet of Things: A Scalable Approach to connecting Everything; Apress Open

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Programme: **Bachelor of Technology**

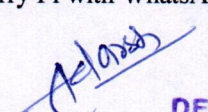
Semester –III

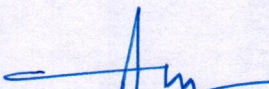
Suggested List of Laboratory Experiments :- (Expandable):

1. Starting Raspbian OS, Familiarizing with Raspberry Pi Components and interface, Connecting to ethernet, Monitor, USB.
2. Displaying different LED patterns with Raspberry Pi.
3. Displaying Time over 4-Digit 7-Segment Display using Raspberry Pi.
4. Raspberry Pi Based Oscilloscope.
5. Setting up Wireless Access Point using Raspberry Pi.
6. Controlling Raspberry Pi with WhatsApp.


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Semester –III

Subject Code	Subject Title	Credit			Theory			Practical		
CBTE-309	Quantitative Aptitude & Logical Reasoning	L	T	P	End Sem (Nil)	Internal (50)	Total (50)	End Sem (Nil)	Internal (Nil)	Total (Nil)
		1	-	-			Min: 20 (D Grade)			

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: 50	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 50
Practical Internal Max Marks: Nil	Lab Performance / Attendance/ Quiz -Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	The logical reasoning and quantitative ability represents a systematic way to judge a candidate's mental capability as how he/she performs certain tasks and reacts to different situations.
Course Outcomes	Student will be able to learn: 1. Solve the problem of number system. 2. Discuss basic concept of algebra, geometry and complex number. 3. Elaborate the concept of probability, set theory and trigonometry. 4. Analyze actively to do logical reasoning such as binary logic, family tree, logical sequence, reflecting on their work. 5. Explore and apply key concepts in logical and quantitative thinking to business problems.

Unit	Contents (Theory)	Marks Weightage
I	Quantitative Aptitude I: LCM and HCF, Percentages, Profit and Loss, Interest (Simple and Compound), Speed, Time and Distance; Time and Work; Averages; Ratio and Proportion, Number System	10
II	Quantitative Aptitude II: Algebra, Geometry/ Mensuration, Pure Math, Venn diagrams, Linear Equations, Quadratic Equations, Complex Numbers, Logarithm, Progressions	10
III	Quantitative Aptitude III: Permutation and Combination, Binomial Theorem, Surds and Indices, Inequalities, Probability Functions, Set Theory, Mixtures and Allegations, Co-ordinate Geometry, Trigonometry	10
IV	Logical Reasoning I: Clocks, Calendars, Binary logic, Seating Arrangement, Blood Relations (Family Tree), Logical Sequence, Assumption, Premise, Conclusion	10
V	Logical Reasoning II: Linear and matrix arrangement, Team Formation, Direction Sense and Decision Making, Syllogism, Cubes, Rows, Quantitative Reasoning, Puzzles, Logical Reasoning based on Rankings, Critical Reasoning	10

Text Book/References Books/ Websites:

1. Dr. R.S. Aggarwal; Quantitative Aptitude for Competitive Examinations; S. Chand Publication
2. Dr. R.S. Aggarwal; A Modern Approach To Logical Reasoning; S. Chand Publication
3. Arun Sharma; How to Prepare for QUANTITATIVE APTITUDE for CAT ;Mc Graw Hill
4. Arun Sharma; How to Prepare for LOGICAL REASONING for CAT; Mc Graw Hill
5. Sarvesh K Verma ; Quantitative Aptitude Quantum CAT ; Arihant Publication
6. Jaikishan, Premkishan; How to Crack Test of Reasoning; Arihant Publication

Suggested List of Laboratory Practical (Expandable): Nil

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PEOPLE'S UNIVERSITY, BHOPAL***(Applicable for Admitted from Academic Session 2021-22 onwards)*****Programme: Bachelor of Technology****Semester –III**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total	End Sem (Nil)	Internal (50)	Total (50) Min: 20 (D Grade)
CBTE-310	NSS-II/NSO-II	-	-	1			Nil			

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: -Nil	Best of Two Mid Semester Test Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

Pre-Requisite	Nil
Course Objective	1. The purpose of this course is to understand the community in which they work. 2. To understand themselves in relation to their community. 3. Identify the needs and problems of the community and involve them in problem solving process.
Course Outcome	Student will be able to learn: 1. The students the knowledge of improve the quality of educated manpower by fostering social responsibility. 2. Raising society to a higher material and moral level by preparing students for final dedication in the service of nation. 3. Introduce urban students to rural life by living in contact with the community in whose midst their institution is located. 4. Making campus relevant to the needs of the community. 5. To work for community services.

Unit	Contents (Theory)	Marks Weightage
I	Introduction and Basic Concepts of NSS: History and Philosophy & Definition of NSS, Aims& Objectives of NSS, Emblem, flag, Motto, Song, Badge, NSS day etc, Organizational structure (from national to regional level) , Roles and responsibilities of various NSS functionaries.	50
II	NSS Programmes and Activities: Concept of regular activities (one day camp), special seven-day conduction camping, day and night camps and relevance of celebration of important days recognized by united nations, Centre, State Govt. & University, Basis of adoption of village/slums, methodology of conduction survey, financial pattern of the scheme, Coordination with different agencies, Maintenance of the diary	
III	Community Mobilization and Adoption of village: Functioning of community stakeholders, Designing the message in the context of the problem and the culture of the community, Identifying methods of mobilization, Concept of Community development and village adoption.	
IV	Volunteerism and Shramdan: Indian tradition of volunteerism, Value system of volunteerism, Motivation and constraints of volunteerism, Shramdan as a part of volunteerism, Role of NSS volunteers in Swatch Bharat Abhiyan, Role of NSS volunteers in Digital India	
V	Project Work/Practical: The Project should be related from the above topics.	

Text Book/References Books/ Websites:**Suggested List of Laboratory Experiments :- (Expandable): Nil**

1. Project Work/Practical: The Project should be related from the above topics.

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PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2021-22 onwards)*

Programme: Bachelor of Technology

Semester –III

Subject Code	Subject Title	Credit			Theory			Practical		
CBTE-311	Music Vocal-II/ Music Instruments-II	L	T	P	End Sem (Nil)	Internal (Nil)	Total	End Sem (Nil)	Internal (50)	Total (50)
		-	-	1			(Nil)			Min: 20 (D Grade)

Duration of Theory (Externals): -Nil

Theory Internal- Max Marks: -Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

Pre-Requisite	Basic knowledge of rag tal and musical instruments.
Course Objective	Impart a basic knowledge of music sound, sangeet and folk songs (Vocal and Instruments)
Course Outcome	Student will be able to learn: 1. Basic knowledge of Sound. 2. Basic Knowledge of Rabindra & Karnatak Sangeet. 3. Knowledge of various Indian Folk Songs

Unit	Contents (Theory)	Marks Weightage
I	Elementary Study of medium Sound, musical sound and Noise. Study of Vibratory motion, frequency, pitch, magnitude and timber quality duration. Study of Interval, scale, Octave, major tone, minor tone and semi tone & value of each of the three tones. General Knowledge of Rabindra Sangeet. General Knowledge of various folk songs as kajri, Baul, Chaiti, Bhatiali mand, Garba, lavni, Hori, etc.	50

Text Book/References Books/ Websites:

1. Pt. Harishchandra Srivastava ;'Raga Parichay' (Part 1, 2, 3 & 4).
2. Dr. Geeta Banerjee 'Raga Shashtra' (Part 1 & 2)
3. Shanti Govardhan 'Sangeet Shashtra Darpan' (Part 1 & 2)
4. Vasant Sangeet Visharad

Suggested List of Laboratory Experiments :- (Expandable):

1. Practices on of Rabindra Sangeet and any one folk songs (Vocal and Instrumental)

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Programme: Bachelor of Technology

Semester –III

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (50)	Total (50) Min: 20 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-312	Social Engineering	-	-	-						

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: 50	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 50
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	The program's framework was inspired by the realization that an integrated systems approach is the best way to address the set of competencies needed to address societal problems. Numerous opportunities in the business world, the social sector, and government will arise as a result of this integrated programme.
Course Outcomes	Student will be able to learn: 1. Function effectively in teams to accomplish a common goal. 2. An understanding of professional and ethical responsibility. 3. Ability to self-learn and engage in life-long learning. 4. Understanding of the impact of solutions in an economic, societal, and environment context. 5. Psychological manipulation and human behavior of students into performing actions or divulging confidential information.

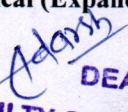
Unit	Contents (Theory)	Marks Weightage
I	Social engineering is one of the most prolific and effective means of gaining access to secure systems and obtaining sensitive information yet requires minimal technical knowledge. Social engineering works by manipulating normal human behavioral traits and as such there are only limited technical solutions to guard against it. As a result, the best defense is to educate users on the techniques used by social engineers, and raising awareness as to how both humans and computer systems can be manipulated to create a false level of trust. This can be complemented by an organizational attitude towards security that promotes the sharing of concerns, enforces information security rules and supports users for adhering to them. Contents are as follows: Introduction of Social Engineering: Definition; Types; Psychology in Social Engineering; The Social Engineering Life Cycle; Human Behavior; Weapons of a Social Engineer; Defense against Social Engineering; Social Engineering Attacks; Examples of Social Engineering Attacks; guidelines to Stay Protected Against Social Engineering Attacks; Reverse Social Engineering.	50

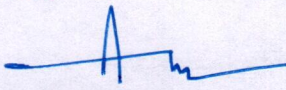
Text Book/References Books/ Websites:

1. Kevin Mitnick; The book of the Art of Deception.
2. www.socialengineer.com/wpcontent/uploads/2017/02/AdvancedPracticalSocialEngineering- Syllabus.pdf.
3. <https://www.exploit-db.com/docs/english/18135-social-engineering---the-human-factor.pdf>.
4. <https://www.jigsawacademy.com/blogs/cyber-security/what-is-social-engineering/>

Suggested List of Laboratory Practical (Expandable): Nil


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Department: Electronics & Communication Engineering

PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*Programme: **Bachelor of Technology**

Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-401	Entrepreneurship and IPR	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test- Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz- Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	The course's major objectives are to educate students with various concepts that are essential to comprehend the processes involved in entrepreneurship, grow small and medium-sized businesses, and promote the entrepreneurial spirit of self-employment. To recognize the importance of IP and to educate the students on basic concepts of Intellectual Property Rights.
Course Outcome	Student will be able to learn: 1. Create and exploit innovative business ideas and market opportunities. 2. Turn market opportunities into a business plan. 3. Demonstrate and present successful work, collaboration and division of tasks in a multidisciplinary and multicultural team. 4. Entrepreneurship and Innovation minors will be able to find problems worth solving. Students advance their skills in customer development, customer validation, competitive marketing and financial analyses, and iteration. 5. Enhanced capability to secure new intellectual properties through Patents and Copyrights

Unit	Contents (Theory)	Marks Weightage
I	Entrepreneurship: Definition and Functions of an Entrepreneur, Qualities of a good entrepreneur; Role of Entrepreneur in Economic Development; Theories of entrepreneur, Socio, Economic, Cultural and Psychological; Entrepreneur Traits and Behavior, Roles in economic growth, employment, social stability, export promotion and indigenization, Creating A Venture, Opportunity Analysis Competitive and Technical Factors, Sources of Fund. Forms of Business Organizations/Ownership – Formation of a Company – procedures and formalities for setting up of New Industry-Sources of information to contact for what and where.	14
II	Management: Importance, Definition and functions; Dimensions of Organizations, Size/Specialization, Behavior Formalization, Authority Centralization, Departmentalization, Span and Line of Control, Technology and Minzberg Organization Typology, Line, Staff & Matrix Organization. Motivation Theories – Maslow, Mc Cullen – Motivation model – need, want, motive and Behavior-Attitude Towards work – Self Assessment and Goal Setting – Achievement, Motivation and Behavior Measurement, SWOT analysis and TA analysis – Stress and Conflict Management; with uncertainty; Creativity and Innovation.	14
III	Marketing: Importance, Definition, Core Concepts of need want and Demand, Project identification and formulation: Sources of Information – Opportunity Guidance – Choice of Technology and its evaluation; Consumer Behavior; Market Survey and research; Preliminary Project Report, Detailed Project Report, Assessing Viability and feasibility of a report. Exchange & Relationships, Product Value, Cost and satisfaction (goods and services) Marketing Environment; Selling, Marketing and Societal Marketing Concepts; Four P's, Product, Price, Placement, Promotion.	14

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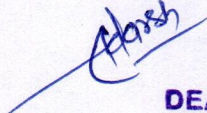
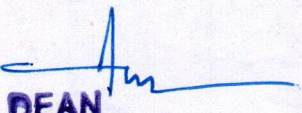
PEOPLE'S UNIVERSITY, BHOPAL***(Applicable for Admitted from Academic Session 2019-20 onwards)*****Programme: Bachelor of Technology****Semester –IV**

	Finance: Nature and Scope, Forms of Business Ownerships, Balance Sheet, Profit and loss Account, Fund Flow and Cash Flow Statements, Breakeven Point (BEP) and Financial Ratio analysis, pay-back period, NPV and capital budgeting. Subsidies and concessions for SSI – role of State and Central Government Agencies in Promotion of Small Scale Industry	
IV	Concept of Property: Theories of Property, Types of Intellectual Property- Origin and Development, Theories of Intellectual Property Rights, Need for Protecting Intellectual Property, Commercialization of Intellectual Property Rights by Licensing, Determining Financial Value of Intellectual Property Rights, Negotiating Payments Terms in Intellectual Property Transaction.	14
V	Introduction to Patent Law, (a) Paris Convention , (b) Patent Cooperation Treaty, (c) WTO-TRIPS , Indian Patent Law, The Patents Act, 1970, Patentable Subject Matter, Patentability Criteria, Procedure for Filing Patent Applications, Patent Granting Procedure, Revocation, Patent Infringement and Remedies, Relevant Provisions of the Biological Diversity Act, 2002, Access and Benefit Sharing Issues.	14

Text Book/References Books/ Websites:

1. Arvindrai N. Desai, Environment and Entrepreneur; Ashish Publishing House, New Delhi.
2. Dr. P. Saravanavel; Entrepreneurial Development; Learntech Press Trichy.
3. P Narendra Singh.; Emerging Trends in Entrepreneurship Development Theories & Practices – Entrepreneurship.
4. Dr. S.R.Myneni; Law of Intellectual Property; 9th Ed, Asia law House, 2019.
5. Dr.G.B Reddy; Intellectual Property Rights and Law; Gogia Law Agency.

Suggested List of Laboratory Practical (Expandable): Nil

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Syllabus

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: Bachelor of Technology

Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
CBEC-402	Digital Circuits & System	L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (35)	Internal (15)	Total (50)
		3	-	1			Min: 40 (D Grade)			Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/Attendance /Quiz- Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	The purpose of the course is to teach principles of digital electronics. The material covers a variety of topics including Boolean algebra, basic gates, logic circuits, flip-flops, registers, arithmetic circuits, counters, interfacing with analog devices, and computer memory.
Course Outcome	Student will be able to learn: 1. The terminology and classification of number system. 2. Combinational Circuits and logic gates. 3. The concept of Sequential Logic Design. 4. Analysis of logic circuits families. 5. Memory System & Conversion Techniques.

Unit	Contents (Theory)	Marks Weightage
I	Introduction: Digital number systems and information representation; arithmetic operations, decimal and alphanumeric codes. Prime Implicants and Essential Prime Implicants definition and simplification using K-maps upto 5 variables & Quine McCluskey method.POSs & SOPs, Binary logic, Boolean algebra (identities, functions and manipulation), standard forms, simplification.	14
II	Combinational Circuits: Logic gates, switch-level and logic CMOS implementation, integrated circuits. Combinational logic design: circuits (gate level), design hierarchy and procedures, computer-aided design. Combinational two-level and multi-level implementations. Arithmetic Circuits (adder, subtractor, multiply) and multiplexers,demultiplexers, encoders, decoders Circuits.	14
III	Sequential Logic Design: latches, flip-flops, state machine design and minimization (Mealy and Moore models), design problems. Language-directed sequential design (VHDL). Registers, Register Transfers and Counters.	14
IV	Digital Circuit: RTL/DTL/DCTL/TTL/MOS/CMOS/ECL, analysis of basic circuits in these families, internal architecture of programmable logic devices.	14
V	Memory System & Conversion Techniques: RAM. ROM, EPROM, EEPROM, PAL, PLDs, PGAs. A/D and D/A conversion techniques and selected case studies.	14

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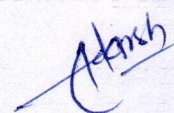
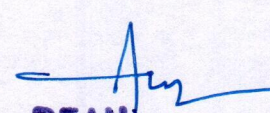
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PEOPLE'S UNIVERSITY, BHOPAL***(Applicable for Admitted from Academic Session 2019-20 onwards)*****Programme: Bachelor of Technology****Semester –IV****Text Book/References Books/ Websites**

1. Morris Mano, Digital Design- Prentice Hall of India Pvt. Ltd
2. H.Taub & D. Schilling, Digital Integrated Electronics, McGraw Hill
3. Douglas L. Perry, VHDL, McGraw Hill, Inc., 2nd Edition, 1993.
4. J.Millman and Halkias, "Integrated Electronics, Analog and Digital Circuits and Systems, Tata McGraw Hill
5. A.Anand Kumar, Digital Electronics, TMH

Suggested List of Laboratory Experiments :- (Expandable): Nil

1. To test and study of operation of all logic Gates.
2. To implementation of basic Gates using Universal Gates.
3. To Study the binary addition by half adder and full adder circuit.
4. To Study the binary subtraction by half subtractor and full subtractor circuit.
5. To Design a BCD to Excess-3 code convertor.
6. To study the verification of Demorgon's Theorem.
7. To Study the operation of R-S Flip Flop.
8. To Study the operation of J-K Flip Flop.
9. To Study the operation of MUX/DEMUX.
10. To Study the applications of 555 timer (Astable, Monostable, Schmitt trigger and VCO).


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PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*

Programme: Bachelor of Technology

Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBEC-403	Analog Circuits	3	1	1						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/Attendance /Quiz- Max. Marks: 15	

Pre-Requisite	Basic Knowledge of Electronics circuits.
Course Objective	To develop an understanding of small signal amplifier design using linear transistor models; and its analysis at low and high frequencies, including different feedback topologies and oscillators.
Course Outcome	Student will be able to learn: 1. The amplifier basics of transistor. 2. Positive and negative feedback and oscillators. 3. The concept power amplifier and its classification. 4. Analysis amplifiers and differential amplifier. 5. Operation amplifier and its specification.

Unit	Contents (Theory)	Marks Weightage
I	Amplifier Basics , Transistor as an amplifier, load line, Q-point and its selection criteria, designing of fixed bias and self-bias, stability of biasing circuits, calculation of stability factor. Transistor at Low Frequency : frequency response, bandwidth, h-parameter analysis of CC, CB and CE configuration, simplified model, gain and impedance calculation of single stage amplifier. Transistor at High Frequency , high frequency model (hybrid- π), Parameters and their definition, Miller capacitance and its effect on voltage gain.	14
II	Feedback Amplifier : positive and negative feedback loop gain, effect of negative feedback on gain stability, distortion, bandwidth, input and output impedance of amplifier, types of feedback (voltage, current, series and shunt) and their analysis. Oscillators : condition of sustained oscillation, RC phase shift, LC (Hartley and Collpit) Oscillators, Wein Bridge, Negative resistance (Tunnel diode and UJT) oscillators, crystal oscillators.	14
III	Power Amplifier , classification, operation, analysis and design of Class A, Class B, Class-AB, Class C, transformer coupled, push pull and complementary symmetry amplifiers, power dissipation in transistors (P_{dmax} rating) and efficiency calculations. Tuned amplifier and its applications, Q factor, selectivity and bandwidth, effect of loading.	14
IV	Cascade Amplifiers , Calculation of gain, Input and output impedance, Effect of Cascading on bandwidth, Transformer, RC and direct-coupled amplifier and their performance. Darlington Connection , equivalent circuit and Calculation of gain and impedances, Cascade amplifier: advantage, circuit diagram and analysis, feedback pair and applications of BIFET, Bootstrapping technique. Differential Amplifier - configuration, transfer characteristics, DC analysis, h-parameter analysis, differential and common mode gain, CMRR, constant current source and current mirror, level shift.	14
V	Operational Amplifier (IC741), specifications, ideal and practical characteristics, frequency response, unity gain bandwidth, limitations, slew rate and its effect on full power bandwidth, input offset voltage, bias and offset currents, compensation. Applications of Op-Amp : Inverting and non-inverting amplifier Analog computation, summer (inverting and non-inverting), average, integrator, differentiator, scalar, sign changer, phase changer, multiplier, buffer, Differential amplifier, instrumentation amplifier, comparator, Schmitt trigger, precision rectifier, log and antilog amplifier, voltage-to-current and current-to-voltage converter.	14

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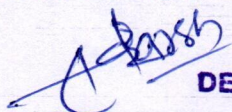
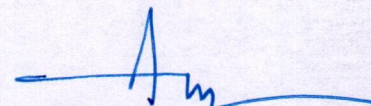
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PEOPLE'S UNIVERSITY, BHOPAL**(Applicable for Admitted from Academic Session 2019-20 onwards)****Programme: Bachelor of Technology****Semester –IV****Text Book/References Books/ Websites:**

1. Millman and Halkias; Integrated electronics; TMH.
2. Gayakwad; OPAMP and Linear Integrated Circuits; Pearson Education.
3. Boylestad and Nashelsky; Electronic Devices and Circuit Theory; PHI.
4. Sendra and Smith; Microelectronics; Oxford Press.
5. Donald A Neamen; Electronic Circuits Analysis and Design; TMH..

Suggested List of Laboratory Experiments :- (Expandable):

1. To Study the operation of Colpitt's Oscillator.
2. To Study the operation of Wein Bridge Oscillator.
3. To Study the operation of Hartley Oscillator.
4. To Study the operation of class A amplifier.
5. To Study the operation of Class B amplifier.
6. To Study the differential amplifier.
7. To Study the OPAMP as a Summing Amplifier.
8. To Study the OPAMP as a Scaling Amplifier.
9. To Study the OPAMP as a Schmitt trigger.
10. To Study the OPAMP as a Logarithmic amplifier.

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PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*

Programme: Bachelor of Technology

Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
CBEC-404	Analog & Digital Communication	L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (35)	Internal (15)	Total (50)
		3	1	1			Min: 40 (D Grade)			Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/Attendance /Quiz- Max. Marks: 15	

Pre-Requisite	Basic knowledge of engineering mathematics
Course Objective	Students will learn analog and digital modulation techniques, communication receiver and transmitter design.
Course Outcome	Student will be able to learn: 1. The knowledge of components of analog communication system. 2. To analyze various methods of Analog transmission and detection. 3. Analogue communication system and noise performance. 4. Sampling and signal reconstruction. 5. Information content of message.

Unit	Contents (Theory)	Marks Weightage
I	Spectral Analysis: Fourier Technique, Fourier Transform and their Properties, Transform of Gate Signal, Impulse Function and Unit Step Function, Fourier Transform Technique for Periodic Signal, Transform of Train of Pulses and Impulses, Sine and Cosine wave. Signal Energy and Power: Spectral Density of various types of signals, Spectra (Parseval's Theorem), Density Spectra of Periodic Gate and Impulse train.	14
II	Modulation Techniques: Need and types of modulation techniques, Amplitude Modulation, Frequency Spectrum, Power Distribution, Modulation by Complex Signal, Low Level and High Level AM Modulators, Linear Integrated Circuit AM Modulators, Suppressed Carrier Generation (Balance/Chopper and Square Law Modulation), SSB Generator (Phase and Frequency Discrimination Method), VSB Transmission and Application. Detection of AM signals: Envelope Detector Circuit, RC Time Constant, Synchronous Detection Technique, Error in Synchronous Detection, SSB signal detection, PLL and its use in demodulation.	14
III	Angle Modulation: Frequency and Phase Modulation Frequency spectrum, bandwidth requirement, Frequency and Phase Deviation, Modulation Index, NBFM and WBFM, Multiple frequencies FM. FM Modulators: Direct (Parameter Variation Method) and Indirect (Armstrong) Method of frequency modulation. FM Detector: Slope Detector, Foster Seely Discriminator, Ratio Detector and PLL detectors.	14
IV	Digital Data Transmission: Sampling and Analog to digital Conversion Sampling theorem, Sampling and signal reconstruction, Aliasing, Types of sampling, Quantization, PCM, Companding, DPCM, ADPCM, Delta modulation, Adaptive delta modulation, Digital Modulation-Demodulation Techniques Modulation techniques for ASK,FSK, PSK, MSK, BPSK, QPSK, GMSK.	14
V	Information & Channel Capacity: Introduction, Information content of message, Entropy, Entropy of symbols in long independent and dependent sequences, Entropy and information rate of Markoff sources, Shannon's encoding algorithm, Discrete communication channels, Rate of information over a discrete channel, Capacity of discrete memoryless channels, Discrete channels with memory, Shannon- Hartley theorem and its implications, Illustrative problems.	14

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Programme: Bachelor of Technology

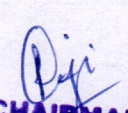
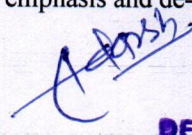
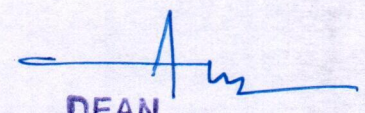
Semester –IV

Text Book/References Books/ Websites:

1. Simon Haykin,; Analog and Digital Communications; John Wiley
2. B.P.Lathi; Digital and analog communication system; Oxford
3. R. P. Singh, S. D. Sapre; Communication Systems; McGraw-Hill Education

Suggested List of Laboratory Experiments :- (Expandable):

1. Study of sampling process and signal reconstruction and aliasing.
2. Study of Amplitude modulation and demodulation.
3. Study of DSB-SC Modulator & Detector.
4. Study of SSB-Sc Modulator & Detector.
5. Study of Frequency and Phase modulation and demodulation
6. Study of Spectrum analyzer and analysis of am and fm signals.
7. Study of PCM transmitter and receiver.
8. Time division multiplexing (TDM) and De multiplexing.
9. Study of ASK PSK and FSK transmitter and receiver.
10. To construct and verify pre emphasis and de-emphasis and plot the wave forms.


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Programme: Bachelor of Technology

Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBEC-405	Electronic Instrumentation	2	-	1						

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks: 15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance – Max. Marks: 05
Practical Internal Max Marks: 15	Lab Performance/Attendance /Quiz- Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	Understand construction, working principle and types of oscilloscopes. Comprehend different types of signal generators and analyzers, their construction and operation.
Course Outcome	Student will be able to learn: 1. The Measurement and Error. 2. To analyze Cathode Ray Oscilloscope. 3. AC Bridges & Transducer. 4. Wave Analyzer & Wave Generator. 5. Digital Measurement and Instruments.

Unit	Contents (Theory)	Marks Weightage
I	Measurement and Error , Accuracy and Precision, Sensitivity, Linearity, Resolution, Hysteresis, Loading Effect. Measurements of Current, Voltage, Power and Impedance: DC and AC Ammeter, DC Voltmeter-Chopper type and solid-state, AC voltmeter using Rectifier, Average, RMS, Peak Responding voltmeters, Multi-meter, Power meter, Bolometer and Calorimeter.)	07
II	Cathode Ray Oscilloscope (CRO) : Different parts of CRO, Block diagram, Electrostatic focusing, Electrostatic deflection, Post deflection acceleration, Screen for CRTs, Graticules, Vertical and Horizontal deflection system, Time base circuit, Oscilloscope Probes, Applications of CRO, Special purpose CROs-Multi input, Dual trace, Dual beam, Sampling, Storage (Analog and Digital) Oscilloscope. Different electronic component testing with CRO.	07
III	AC Bridges : Maxwell's bridge (Inductance and Inductance-Capacitance), Hay's bridge, Schering bridge (High voltage and Relative permittivity), Wein bridge, Wagner earth detector, Impedance measurement by Q-meter. Non-Electrical Quantities (Transducer) : Classification of Transducers, Strain gauge, Displacement Transducer- Linear Variable Differential Transformer (LVDT) and Rotary Variable Differential Transformer (RVDT), Temperature Transducer-Resistance Temperature Detector (RTD), Thermistors, Thermocouple, Piezo-electric transducer, Optical Transducer- Photo emissive, Photo conductive, Photo voltaic, Photo-diode, Photo Transistor, Nuclear Radiation Detector.	07
IV	Wave Analyzer (Frequency selective and Heterodyne), Harmonic Distortion Analyzer, Spectrum Analyzer, Network Analyzer, Signal and Function Generators, Sweep Frequency Generator, Pulse and Square Wave Generator, Beat Frequency Oscillator.	07
V	Digital Measurement and Instruments : Advantages of Digital Instrument over Analog Instrument, Digital-to-analog conversion (DAC) - Variable resistive type, R-2R ladder Type, Binary ladder, Weighted converter using Op-amp and transistor, Practical DAC. Analog-to-digital Conversion (ADC) -Ramp Technique, Dual Slope Integrating Type, Integrating Type (voltage to frequency), Successive Approximations, digital voltmeters and multi-meters, Resolution and sensitivity of digital meter, PLC structure, principal of operation, response time and application.	07

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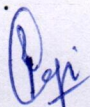
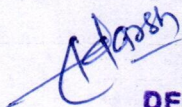
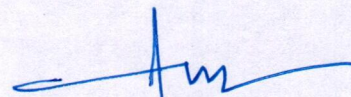
Semester –IV

Text Book/References Books/ Websites

1. H. S. Kalsi; Electronics Instrumentation; TMH.
2. A.K. Sawhney; Instrumentation and Measurements; Dhanpat Rai and Co.
3. Helfric and Cooper; Modern Electronic Instrumentation and Measurement Techniques; Pearson.

Suggested List of Laboratory Experiments :- (Expandable):

1. Study of CRO and Function Generator.
2. To Measure Phase difference between LVDT secondary winding.
3. To study input output Characteristics of LVDT
4. To Study the linear range of operation of LVDT
5. To Determine sensitivity of LVDT
6. To measure the value of unknown capacitance with the help of Schering bridge
7. To measure the value of unknown inductance with the help of Anderson bridge
8. To Study the operation of Maxwell's capacitance bridge and to measure the value of unknown inductance and Q factor.
9. To Measure the value of unknown resistance using Wheatstone bridge
10. Force measurement by strain gauge.

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Programme: Bachelor of Technology

Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (Nil)	Internal (50)	Total (50) Min: 20 (D Grade)
CBEC-406	Simulation Lab	-	-	1						

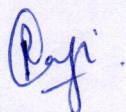
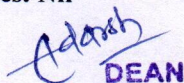
Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance – Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/Attendance /Quiz - Max. Marks: 50	

Pre-Requisite	Nil
Course Objective	To provide background and fundamentals of simulation tool for the analysis and processing of signals and to generate various continuous and discrete time signals.
Course Outcome	Student will be able to learn: 1. Basics of software. 2. Basics of electronic circuits. 3. The study of PCB layout. 4. The use of virtual instruments built in the software. 5. Operation of components and its specification

Unit	Contents (Theory)	Marks Weightage
I	Study of circuit simulation software (any one-TINA-PRO/PSPICE/CIRCUIT MAKER/GPSIM/SAPWIN/ Mentor PADS etc): Overview and Study of the key features and applications of the software. Application of the software in the field of Electronic Devices, Electronic Instrumentation and Network Analysis. Design, Optimization and simulation of: 1. Basic Electronic circuits (examples rectifiers, clippers, clampers, diode, transistor Characteristics etc). 2. Transient and steady state analysis of RL/ RC/ RLC circuits, realization of network Theorems. 3. Use of virtual instruments built in the software. Study of PCB layout software: Overview and use of the software in optimization, designing and fabrication of PCB pertaining to above circuits simulated using above simulation software or other available. Students should simulate and design the PCB for at least two circuits they are learning in the current semester.	50

Text Book/References Books/ Websites: Nil

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Suggested List of Laboratory Experiments :- (Expandable):

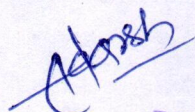
Student should perform & test at least 10 electronic components/instruments related to subjects.

1. Soldering Practice.
2. Basic Dimmer Circuit
3. Light Detector Circuit
4. 555 Timer Circuits
6. CRO & Multimeter Study
7. Burglar Alarm Circuit
8. Microprocessor Programming Labs
9. Scrolling LED's with a Microprocessor
10. Clap on/ Clap off Circuit



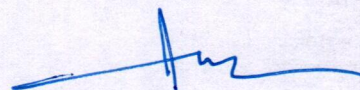
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Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBTE -407	NCC-IV	2	-	1						

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks:15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05
Practical Internal Max Marks: 15	Lab Performance/ Quiz/Attendance - Max. Marks: 15	

Pre-Requisite	Nil
Course Outcome	1. Develop a sense of time management and social skills. 2. Understand the life history & leadership qualities of personalities who have contributed in Nation Building and Literature. 3. Understand the role of NCC cadets as 2nd line Defence in 1965 War. 4. Develop awareness about various types of Natural and manmade disasters. 5. Know about life saving tips during disasters. 6. Acquainted about Fire Services. 7. Understand importance of Environmental Awareness & conservation. 8. Understand importance of General Awareness. 9. Know about Armed Forces.
Course Outcomes	Student will be able to learn: 1. Effectively manage time. 2. Develop the qualities of social skills. 3. Imbibe leadership qualities. 4. Do group discussions effectively. 5. Be motivated to serve the nation by joining Armed forces. 6. Contribute in environmental awareness and conservation activities. 7. Keep abreast of current affairs & general awareness. 8. Effectively contribute in managing disaster relief tasks.

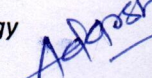
Unit	Contents (Theory)	Marks Weightage
I	Personality Development : Group Discussions –Social Skills & Time management	07
II	Leadership Development : Case Studies –Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965 war.	07
III	Disaster Management: (i) Initiative Trg, Organising Skills. (ii) Do's and Don'ts. (iii) Natural Disasters. (iv) Man Made Disasters. (v) Fire Services and Fire Fighting.	07
IV	Environmental Awareness: Adventure Environmental Awareness and Conservation. General Awareness: General Awareness.	07
V	Armed Forces: Army, Navy, Air Force and Central Armed Police Forces.	07

Text Book/References Books/ Websites:

1. Cadet's handbook, NCC Directorate, MP, CG.
2. Supplementary cadet's handbook, NCC Directorate, MP, CG.

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PEOPLE'S UNIVERSITY, BHOPAL**(Applicable for Admitted from Academic Session 2019-20 onwards)****Programme: Bachelor of Technology****Semester –IV****Suggested List of Laboratory Practical (Expandable):****1. Drill**

- Arm Drill.
- Salami Shastra.
- Squad Drill with Arms

2. Weapon Training: Short Range firing**3. Map Reading**

- Map to Ground.
- Ground to Map.

4. Field Craft & Battle Craft

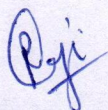
- Fire and Move Capsule.
- Field signal- with hand, with Weapons, Signal with Whistle.
- Field signals as means of giving orders.
- Field signals by day, Field signals by night.
- Section Formation.

5. Social Service and Community Development: Cadets will participate in various activities throughout the semester e.g., Blood donation Camp, Swachhata Abhiyan, Constitution Day, Jan Jeevan Hariyali Abhiyan, Beti Bachao Beti Padhao etc as per the requirement and similar announced days- National and State level

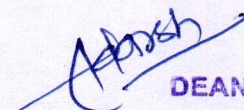
6. Health & Hygiene

- Hygiene & Sanitation (Hygiene- Personal & Camp Hygiene).
- First Aid in common medical emergencies.
- Treatment & Care of Wounds.

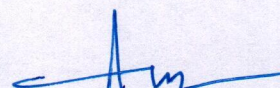
Note: Examination of this NCC course will be conduct as per NCC head quarter norms in consultation with office of COE, PU.


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Programme: Bachelor of Technology

Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (50)	Total (50) Min: 20 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-408	Research Methodology	1	-	-						

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: 50	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 50
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	To get to know about research and its analysis.
Course Outcomes	Student will be able to learn: 1. To understand the objective and types of research. 2. To understand basic concepts of research formulations. 3. About various design methods. 4. To know about how data is collected for analyzing process & thesis writing. 5. To understand report and thesis writing.

Unit	Contents (Theory)	Marks Weightage
I	Objectives and Types of Research: Motivation and objectives – Research methods vs Methodology. types of research – Descriptive vs. Analytical, Applied vs Fundamental, Quantitative vs Qualitative, Conceptual vs. Empirical.	10
II	Research Formulation: Defining and formulating the research problem - Selecting the problem - Necessity of defining the problem - Importance of literature review in defining a problem.	10
III	Research Design and Methods: Research design – Basic Principles- Need of research design, Features of good design – Important concepts relating to research design – Observation and Facts. Developing a research plan - Exploration, Description, Diagnosis, and Experimentation.	10
IV	Data Collection and Analysis: Execution of the research - Observation and Collection of data - Methods of data collection – Sampling Methods- Data Processing and Analysis strategies - Data Analysis with Statistical Packages - Hypothesis-testing, Generalization and Interpretation.	10
V	Reporting and Thesis Writing: Structure and components of scientific reports - Types of report – Technical reports and thesis – Significance – Different steps in the preparation – Layout, structure and Language of typical reports – Illustrations and tables - Bibliography, referencing and footnotes.	10

Text Book/References Books/ Websites:

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal,;An introduction to Research Methodology;RBSA Publishers.
2. Kothari, C.R.;Research Methodology: Methods and Techniques;New Age International.
3. Sinha, S.C. and Dhiman; Research Methodology; Ess Publications. 2 volumes.

Suggested List of Laboratory Practical (Expandable): Nil

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PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*

Programme: Bachelor of Technology

Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
CBTE-409	Environmental Science	L	T	P	End Sem (Nil)	Internal (100)	Total (100)	End Sem (Nil)	Internal (Nil)	Total (Nil)
		1	-	-			Min: 40 (D Grade)			

Duration of Theory (Externals): Nil

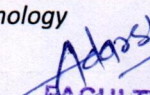
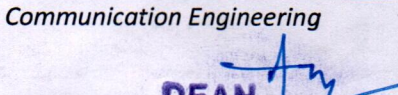
Theory Internal- Max Marks: 100	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 100
Practical Internal Max Marks: Nil	Lab Performance / Quiz/Attendance -Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	Imparting basic knowledge about the environment and its allied problems and developing an attitude of concern for the environment.
Course Outcomes	Student will be able to learn: 1. Conceptual knowledge of energy resources with its applications. 2. To understand the ecosystems and value of these ecosystems to humans and to animals and plants. 3. Developing awareness of biodiversity and its conservation. 4. Categorize different types of pollutions and their control measures. Discover effective methods of waste Management. Analyze global environmental problems and come out with best possible solutions. 5. Understand environmental laws and sustainable development.

Unit	Contents (Theory)	Marks Weightage
I	Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. The multidisciplinary nature of environmental studies. Definition, scope and importance, Need for public awareness.	20
II	Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries).	20
III	Biodiversity and its conservation: Introduction-Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values. Biodiversity at global, national and local level. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. In-situ and Ex-situ conservation of biodiversity.	20
IV	Environmental Pollution: Definition, Causes, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear pollution. Solid waste management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Disaster management: floods, earthquake, cyclone and landslides.	20
V	Environmental Policy, Legislation, Rules And Regulations : National Environmental Policy Environmental Protection act, Legal aspects Air (Prevention and Control of pollution) Act1981, Water (Prevention and Control of pollution) Act-1974, Water pollution Act-1977, Forest Conservation Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules .	20

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(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Bachelor of Technology**

Semester –IV

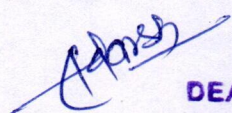
Text Book/References Books/ Websites:-

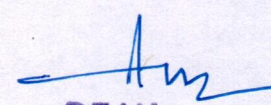
1. Dr. S. S. Dara and Dr. D. D. Mishra; A textbook of Environmental Chemistry and Pollution Control, S. Chand & Company Ltd.
2. Dr. Suresh K. Dhameja; Environmental studies; S K Kataria and Sons.
3. A. Ristinen and Jack J. Kraushaar; Energy and the Environment, 2nd Edition: Robert; Shree Sai Publication
4. Anindita Basak ; Environmental Studies; Pearson Publications.
5. Gilbert M. Masters; Introduction to Environmental Engineering and Science; Prentice-Hall Publications.

Suggested List of Laboratory Practical (Expandable): Nil


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Syllabus

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: Bachelor of Technology

Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
CBTE-410	Massive Open Online Courses (MOOCs)-I	L	T	P	End Sem (Nil)	Internal (Nil)	Total	End Sem (Nil)	Internal (50)	Total (50)
		-	-	1			(Nil)			Min: 20 (D Grade)

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/Attendance /Quiz - Max. Marks: 50	

Pre-Requisite	Nil
Course Objective	MOOCs build on the engagement of learners who self-organize their participation according to learning goals, prior knowledge and skills, and common interests. Objective of this course is to improve the technical skills of students and its gives an opportunity to explore themselves beyond class room teaching.
Course Outcomes	Student will be able to learn: New interesting courses of their own curiosity and improve their knowledge and skills. MOOCs give an opportunity to connect openly on a global scale, with global learners. The ability to experiment with pedagogical methods on a vast scale.

Unit	Contents (Theory)	Marks Weightage
I	Massive Open Online Courses (MOOCs) are online courses that allow participants free access and unrestricted participation in any course of their choice. Besides the conventional modes of teaching such as lectures, videos and reading material, MOOCs also provide a platform for interactive forums. After the III semester End Sem Examination, all students are instructed to register themselves in a minimum IV (Four weeks) MOOC/NPTEL/SWAYAM Certification course in their Engineering discipline. Students must appear in the certification examination conducted by NPTEL/ SWAYAM and submit it to their respective assigned faculty before the end of the semester. A student should give an effective PowerPoint presentation of a chosen course in the class seminars and receive feedback from each other. This effort will help them to communicate their ideas more clearly. The final evaluation of this course will base on a PowerPoint Presentation and Certification during the academic session by the assigned faculty.	50

Text Book/References Books/ Websites:

1. <https://swayam.gov.in/>
2. <http://nptel.ac.in>
3. <https://onlinecourses-archive.nptel.ac.in>

Suggested List of Laboratory Practical (Expandable): Nil

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Department: Electronics & Communication Engineering

PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*

Programme: Bachelor of Technology

Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (50)	Total (50) Min: 20 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-411	Sociology	1	-	-						

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: 50	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 50
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz - Max. Marks: Nil	

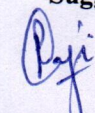
Pre-Requisite	Nil
Course Objective	The objective of this course is to provide students a basic understanding of sociological concepts.
Course Outcomes	Student will be able to learn: 1. The meaning of Sociology and its importance. 2. The basic concepts involved in sociology. 3. About the social changes 4. About the Basic Social structure. 5. Understand the social law and its control.

Unit	Contents (Theory)	Marks Weightage
I	Introduction: Sociology: definitions, aim and objective; Relation with other social sciences – law and history; Important theoretical approaches: evolutionism, functionalism, conflict theory, interactionist theory; Law as a tool of social engineering: Durkheim, Weber, Pound and Bentham	10
II	Basic Concepts: Social Groups: Cooley and Sumner; Community; Association; Tribes; Social Groups; Status and Role	10
III	Social Change: Social Reform Movements in India – Raja Ram Mohan Roy, Jyotiba Phule, Naicker, etc.; Modernization and Post Modernization; Liberalization and Globalization; Fordism and Mc Donaldization	10
IV	Social Structure: Culture: Culture Relativism, Racism, Ethnicity and Ethnocentrism; Socialization; Status and Role	10
V	Social Control: Custom as an Agency of Control; Law as an Agency of Control; Media as an Agency of Control; Public Opinion as an Agency of Control	10

Text Book/References Books/ Websites:

1. Vidya Bhushan and D.R. Sachdeva, An Introduction to Sociology; Kitab Mahal Publisher, New Delhi
2. Desai, N. and M. Krishnaraj Women and Society in India; Ajanta Publications; 1987
3. Myneni Sociology; Allahabad Law Agency, Faridabad; 2004 Goode, W.J. and P.K. Hatt Methods in Social Research; McGraw- Hills; New York; 1952
4. Giddens, A. Sociology; Polity Press, UK; 1993

Suggested List of Laboratory Practical (Expandable): Nil



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Programme: Bachelor of Technology

Semester –IV

Subject Code	Subject Title	Credit			Theory			Practical		
CBTE-412	Fine Arts-II	L	T	P	End Sem (Nil)	Internal (Nil)	Total	End Sem (Nil)	Internal (50)	Total (50)
		-	-	1			(Nil)			Min: 20 (D Grade)

Duration of Theory (Externals): -Nil

Theory Internal- Max Marks: -Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

Pre-Requisite	Basic knowledge of art and drawing
Course Objective	To teach the core competencies of critical and conceptual thinking through the continual observation and analysis of the visual and social world also provide a strong philosophical and historical foundation of the visual arts and its impact.
Course Outcome	Student will be able to learn: 1. Increase ability to communicate with people. 2. Learn to sketch and take field dimensions. 3. Skillfully create artistic form using techniques and methods appropriate to the intended result. 4. Learn to take data and transform it into graphic drawings.

Unit	Contents (Theory)	Marks Weightage
I	History of Indian Painting II :Cave Paintings of India- Ajanta, Bagh, Jain, Pal (Apabhransh), Mughal Painting- Akbar and Jahangir Rajasthani painting- Mewar, Kishangarh, Jaipur	50

Text Book/References Books/ Websites:

1. Lokesh Chandra Sharma; A Brief History of Indian Painting.
2. R.A. Agrawal; Roop Prad Kala Ke mool Adhar.

Suggested List of Laboratory Experiments :- (Expandable):

1. Composition :- Human Figure with Background Poster Colour
2. Copy work :- Indian Miniature

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Programme: Bachelor of Technology

Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-5101	Gender Equality	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test- Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz- Max. Marks: Nil	

Pre-Requisite	Fluency in English; Basic knowledge about Constitutional Law and Criminal Law.
Course Objective	This course is aimed at discussing the interface between law and gender equality. It also aims to sensitize and create awareness about gender related issues.
Course Outcome	Student will be able to learn: 1. The concept of gender equality. 2. Relationship between gender and the law. 3. Different aspects of gender discrimination and reforms 4. National and International efforts towards creating gender equality. 5. Presence of Women-Centric Laws in India

Unit	Contents (Theory)	Marks Weightage
I	Introduction: Meaning of Sex and Gender; History of Gender Movements; Gender roles and gendered division of labour, Private vs public divide and gender inequality; Physical difference, attributes and behavioural dispositions.	14
II	Women as Workers: Unpaid, underpaid and casual work; Women in primary, secondary and tertiary sectors; Classification of work in Indian census and NSSO – Main workers, marginal workers, non-workers; Invisibility of women's work, problems in measurement; Non-recognition of women's work in national income accounting.	14
III	Gender and Health: Poverty, Gender Discrimination and Under Nutrition; Epidemiology of Menstruation and Menstrual Disorder; Early Marriage, Unwanted Pregnancy and Unsafe Abortions; Adolescent Pregnancy and Sexually Transmitted Infection and HIV/AIDS; Health issues relating to Violence: Sexual Abuse, Immoral Trafficking, Rape.	14
IV	Gender Based Violence in Community and State: Rape as a weapon of oppression – causes and implications; Sexual abuse and harassment; Trafficking of Women and Girls; State Violence; Custodial violence; Violence by law enforcing agency; Genocide; Armed Conflict, Displacement and Gender Abuse; War crimes and Sexual abuse; Sexual Assault of Refugees and Displaced Women; New Forms of Violence against Women - Online Violence and its Implications.	14
V	Response to Violence Against Women: International & National response: International Initiatives – legal and policy framework, National Human Rights Commission, National Commission for Women, Law Enforcing Agencies: All Women's Police Stations, Vigilance Cells; Legal Aid Cells; Judiciary: Family Courts/ Mahila Courts; Service Providers: Helplines, Women and Children Help lines; Non-State Actors: INGOs and NGOs, Collective protests, Restorative justice in the context of gender violence.	14

Text Book/References Books/ Websites:

1. Chaudhuri, Maitrayee ;Feminisms in India. Kali for Women; New Delhi
2. Chaudhuri, Maitrayee ;The Indian Women's Movement: Reform and Revival ;Reprinted. Delhi: Palm Leaf. pp. 1-68.

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Programme: **Bachelor of Technology**

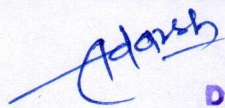
Semester –V

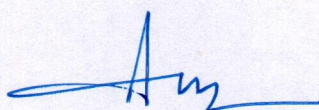
3. Gandhi, N.; When the rolling Pins hit the street: a case study of the Anti-price rise Movement in India; New Delhi.
4. Alexander; Linda Lewis et al (eds) ; New Dimensions in Women & Health.

Suggested List of Laboratory Practical (Expandable): Nil


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Programme: Bachelor of Technology

Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
CBTE-5102	Human Health & Nutrition	L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total
		3	-	-			Min: 40 (D Grade)			(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test- Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz- Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	A study of nutrition and food as applied to daily living. The course provides information on basic nutrition and wellness concepts in relation to the individual and family throughout life.
Course Outcome	Student will be able to learn: 1. Basic concepts in food and nutrition. 2. Know different types of nutrients. 3. The basic food groups. 4. Various cooking methods 5. Normal body parameters.

Unit	Contents (Theory)	Marks Weightage
I	Basic Concepts in Food and Nutrition: Basic terms used in study of food and nutrition, Understanding relationship between food nutrition and health, Functions of food-Physiological, Psychological and social.	14
II	Nutrients: Functions, dietary sources and clinical manifestation of deficiency / excess of the following nutrients: Carbohydrates, Lipids and Proteins, Fat soluble vitamins – A,D,E and K, Water soluble vitamins- thiamin, riboflavin, niacin, pyridoxine, Folate, vitamin B12 and vitamin C, Minerals- calcium, iron and iodine.	14
III	Food Groups: Selection, nutritional contribution and changes during cooking of the following food group: ▪ Cereals ▪ Fats and oils ▪ Eggs ▪ Pulses ▪ Fruits and vegetables ▪ Milk and milk products ▪ Meat, poultry and fish	14
IV	Methods of Cooking and Preventing Nutrient Losses: Dry, moist, frying and microwave cooking, Advantages disadvantages and the effect of various methods of cooking on nutrition's, Minimizing nutrient losses.	14
V	Basic Concepts in Food and Nutrition: Basic terms used in study of food and nutrition, Understanding relationship between food nutrition and health, Functions of food-Physiological, Psychological and social.	14

Text Book/References Books/ Websites:

1. Swaminathan; M Hand book of foods and nutrition fifth Ed;Bappco.
2. Srilakshmi B; Nutrition Science 2012; New Age international (P) LTD.
3. Mudambi, SR and Rajagopal; Mv fundamentals of foods Nutrition and Diet Therapy; Fifth Ed: 2012
4. Khanna K Gupta S Seth R Mahana R. Rekhi T.; The AM an and Science of cooking .

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: Bachelor of Technology

Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-5103	Ethical Hacking and Cyber Security	3	-	-						

Duration of Theory (Externals): 3 Hours

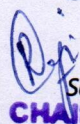
Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance –Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz- Max. Marks: Nil	

Pre-Requisite	Student should have basic knowledge of computer.
Course Objective	To prepare students with the technical knowledge and skills needed to protect and defend computer systems and networks.
Course Outcome	Student will be able to learn: 1. Identify and analyze the stages an ethical hacker requires to take in order to compromise a target system. 2. Techniques to carry out a penetration testing. 3. About various types of attacks, attackers and security threats. 4. Gain knowledge of the tools, techniques and ethical issues likely to face the domain of ethical hacking and ethical responsibilities. 5. Understand details of cybercrime.

Unit	Contents (Theory)	Marks Weightage
I	Introduction: Understanding the importance of security, Concept of ethical hacking and essential Terminologies- Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit, Phases involved in hacking.	14
II	Foot printing: Introduction to foot printing, Types of foot printing, Understanding the information gathering methodology of the hackers, Tools used for the reconnaissance phase.	14
III	System Hacking: Aspect of remote password-guessing Role of Eavesdropping, Various methods of password cracking, Keystroke Loggers, Understanding Sniffers, Comprehending Active and Passive Sniffing, ARP Spoofing and Redirection, DNS, and IP Sniffing, HTTPS Sniffing.	14
IV	Hacking Wireless Networks: Introduction to 802.11, Role of WEP, Cracking WEP Keys, Sniffing Traffic, Wireless DOS attacks, WLAN Scanners, WLAN Sniffers, Hacking Tools, Securing Wireless Networks.	14
V	Introduction to Cybercrime: Defining Cybercrime, Understanding the Importance of Jurisdictional Issues, Quantifying Cybercrime, Differentiating Crimes That Use the Net from Crimes That Depend on the Net, working toward a Standard Definition of Cybercrime, Categorizing Cybercrime, Developing Categories of Cybercrimes, Prioritizing Cybercrime Enforcement, and Reasons for Cybercrimes.	14

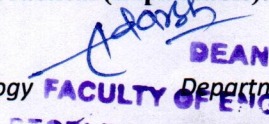
Text Book/References Books/ Websites:

1. Rajat Khare; Network Security and Ethical Hacking; Luniver Press
2. Thomas Mathew; Ethical Hacking; EC Council
3. Debby Russell and Sr. G.T Gangemi; Computer Security Basics; O' Reilly Media
4. Thomas R Peltier, Justin Peltier and John blackley; Information Security Fundamentals; Prentice Hall

Suggested List of Laboratory Practical (Expandable): Nil


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Programme: Bachelor of Technology

Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-5104	Industrial Safety and Environment	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Student has fundamental knowledge about various types of industries.
Course Objective	To make the students familiar with various industrial safety and their relative acts.
Course Outcomes	Student will be able to learn: 1. Demonstrate an integrative approach to analyses of safety in various industries. 2. Ability to analyses various types industrial accidents. 3. The ability to apply the fundamental knowledge in environmental factors. 4. Students will understand the basic about industrial hazards. 5. The students will be able to identify types of industrial acts.

Unit	Contents (Theory)	Marks Weightage
I	Industrial Safety: Electrical safety, Construction safety, Chemical safety, Fire safety, Need of safety, Safety programmes, Industrial safety principle, Safety policy, Safety inspection, Safety legislation, Safety measures, Safety audit.	14
II	Industrial Accidents: Types of accidents, Nature and effect of accidents, Causes, Preventions, Accident management, Reporting, Investigations, Laws and Acts, Safety education and training.	14
III	Environmental Factors: Environment introduction, Need of environment control, Safe working environment, Entry and exit, Housekeeping, Work area, Floors and other surfaces, Workstations, Welfare facilities, Air quality, Temperature, Illumination, Noise, Vibrations, Plant layout, Lighting, Ventilations.	14
IV	Industrial Hazards: Classification, Categories, Hazard management, Identification and hazard control, Physical hazard, Chemical hazard, Biological hazard, Psychosocial hazard, Fire hazard, Health hazard, HAZOP, Major industrial hazard, Security management.	14
V	Industrial Acts: Factories act, 1948, Workers safety act, Provision of acts, Requirements of acts, Duties of inspector, OSHA, Indian electricity act -1910, Indian boiler act -1923, Mines act-1952, Petroleum act-1934, Minimum wages act-1948, The payment of wages Act-1936, Employee state insurance act, Workmen compensation act.	14

Text Book/References Books/ Websites:

1. Anupama Prashar; Industrial Safety & Environment, S.K. Kataria and Sons Publication.
2. R. K. Jain and Sunil S. Rao; Industrial Safety, Health and Environment Management Systems; Khanna Publishers.
3. Thomas D. Schneid; Safety Law: Legal Aspects in Occupational Safety and Health (Occupational Safety & Health Guide Series), CRC Press.
4. Pravin M.Pathak & Jayant P. Khairnar; Industrial Safety Management: Safety, Health & Environment Management; Notion Press.
5. R.K. Mishra ; Safety Management: Safety, Health & Environment Management; AITBS Publishers.

Suggested List of Laboratory Practical (Expandable): Nil

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BOARD OF STUDIES (ENGINEERING)
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Syllabus

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: Bachelor of Technology

Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
CBEC-502	Electromagnetic Theory	L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total (Nil)
		3	-	-			Min: 40 (D Grade)			

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz- Max. Marks: Nil	

Pre-Requisite	To have knowledge of engineering mathematics.
Course Objective	To understand, develop and design various applications involving electromagnetic fields.
Course Outcome	Student will be able to learn: 1. To apply vector calculus to static electric-magnetic fields. 2. To analyze Maxwell's equation in different forms 3. To analyze the nature of electromagnetic wave propagation in guided medium. 4. Time Varying Fields and Maxwell's Equations. 5. Wave Equation and Plane Waves.

Unit	Contents (Theory)	Marks Weightage
I	Coordinate System and Vector Fields: Cartesian coordinate system, Cylindrical Coordinate System, Spherical Coordinate System, Transformation of Coordinate system, vector algebra, Line integral, Surface integral and volume integral, Gradient, Divergence, Curl, Green's theorem, Divergence theorem, Stoke's theorem.	14
II	Electrostatic Fields: Coulomb's law, Gauss's law and its application, Electric Field Intensity, Electric Flux Density, Electrostatic Potential and work, Line Charge, Surface Charge, Volume Charge, Poisson's and Laplace's equations, Equation of continuity, Conductors, Dielectrics, Capacitance, Boundary conditions for Electrostatic field.	14
III	Static Magnetic Fields: Biot-Savart Law and its Application, Ampere's Law and its Application, Magnetic Field intensity, Magnetic field due to straight conductor, circular loop, infinite sheet Magnetic Flux Density, Scalar and Vector Potential, Magnetic forces, Magnetic Torque, Magnetic Dipole Moment, Energy stored in Magnetic field, Inductance and Mutual Inductance Boundary conditions for magnetic field.	14
IV	Time Varying Fields and Maxwell's Equations: Faraday's law of electromagnetic, Displacement Current, Maxwell's equations in Differential and Integral Form, Maxwell's equations in free space, Maxwell's equations for harmonically varying, static and steady field, time-harmonic fields.	14
V	Wave Equation and Plane Waves: Helmholtz wave equation, Solution to wave equations and plane waves, Wave polarization, Poynting vector and Poynting Theorem, power flow in electromagnetic fields, Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors, skin depth, Plane wave reflection and refraction, Standing Wave, Applications.	14

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Programme: **Bachelor of Technology**

Semester –V

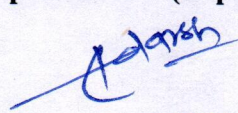
Text Book/References Books/ Websites:

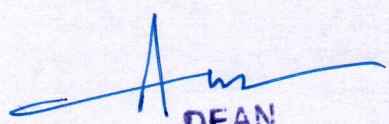
1. Mathew N. O. Sadiku; Principles of Electromagnetics; Oxford University Press Inc.
2. D. K. Cheng; Field and Wave Electromagnetics; Pearson.
3. Ashutosh Pramanik; Electromagnetism – Theory and Applications; PHI.

Suggested List of Laboratory Experiments :- (Expandable): Nil


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Programme: Bachelor of Technology

Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBEC-503	Signal & System	3	1	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz- Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	This subject clears mainly the classification of the signals and systems with their various time and frequency domain analysis for future applications.
Course Outcome	Student will be able to learn: 1. The basics of systems and signals. 2. Sampling & reconstruction. 3. Fourier transforms and their applications to systems. 4. Laplace-Transforms. 5. Z-Transforms.

Unit	Contents (Theory)	Marks Weightage
I	System and Signal: Definition of signal, Analog & Digital Signals, Continuous time signals, Discrete time signals, Basic elementary signals, Operations on signals, Periodic signals, Even & Odd signals, Power & Energy signals. Definition of system, classification of systems (static & Dynamic, Causal & Non-causal, Stable & Unstable, Time variant & Time-invariant). standard test signal, properties of system, properties of liner system.	14
II	Sampling & Reconstruction: The Sampling Theorem and its implications. Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold. Aliasing and its effects. Relation between continuous and discrete time systems. Introduction to the applications of signal and system theory: modulation for communication, filtering, feedback control systems.	14
III	Fourier Transforms and their applications to systems: Fourier transform definition, properties of F.Ts , energy spectral density, parsevals theorem, power spectral density, Hilbert transforms and properties. Linear Systems – impulse response, response of a linear system, linear time invariant system, linear time variant system, transfer function of LTI system.	14
IV	Laplace-Transforms: Laplace Transform (LT)of continuous time signals, Properties of Laplace transform (Linearity, Time shifting, Time scaling, Time Reversal, Differentiation in s-domain, Differentiation in time domain, Integration in time domain, Initial & Final value theorem), Inverse Laplace, Relation b/w CTFT & LT.	14
V	Z-Transforms: ROC, properties of Z-Transforms Inverse Z-Transforms, Causality and stability. Realization off Discrete Systems: Structural realization of discrete systems – Direct form – I, Direct form-II, Cascade and parallel forms.	14

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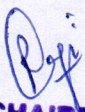
Programme: Bachelor of Technology

Semester -V

Text Book/References Books/ Websites:

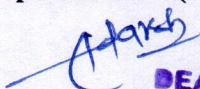
1. Anand Kumar; Signal and Systems; PHI.
2. Simon Haykin and Barry Van Veen; Signals and Systems; Wiley 2005.
3. Alan V. Oppenheim, Alan S. Willsky and Nawab; Signals and Systems; Prentice Hall.
4. K. Gopalan; Signals and Systems; Cengage Learning (India Edition).

Suggested List of Laboratory Experiments :- (Expandable):Nil



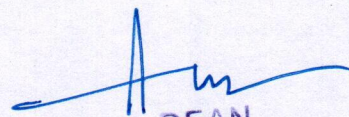
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Programme: Bachelor of Technology

Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBEC-504	Microprocessor & Interfacing	3	1	1						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/Attendance /Quiz- Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	To introduce students with the architecture, programming, interfacing and operation of typical microprocessors.
Course Outcome	Student will be able to learn: 1. To understand basic architecture of 16 bit and 32 bit microprocessors. 2. Execution of instructions and performance of microprocessors. 3. To understand register organization, memory addressing. 4. Fundamental of Programming. 5. To understand interfacing an external device with the processor.

Unit	Contents (Theory)	Marks Weightage
I	Introduction to Digital Computer and Microprocessor: Digital Computers: General architecture and brief description of elements, instruction execution, instruction format, and instruction set, addressing modes, programming system, higher level languages. Buses and CPU Timings: Bus size and signals, machine cycle timing diagram, instruction timing, processor timing. Microprocessor and Microprocessor Development Systems: Evolution of Microprocessor, Microprocessor architecture and its operations, memory, inputs-outputs (I/Os), data transfer schemes interfacing devices, architecture advancements of microprocessors.	14
II	8085 Microprocessor: pin configuration, internal architecture. Timing & Signals: control and status, interrupt: ALU, machine cycles, Instruction Set of 8085: Addressing Modes: Register addressing, direct addressing; register indirect addressing, immediate addressing, and implicit addressing. Instruction format, op-codes, mnemonics, no. of bytes, RTL, variants, no. of machine cycles and T states, addressing modes. Instruction Classification: Data transfer, arithmetic operations, logical operations, branching operation, machine control; Writing assembly Language programs, Assembler directives.	14
III	16-bit Microprocessors: Architecture: Architecture of INTEL 8086 (Bus Interface Unit, Execution unit), register organization, memory addressing, memory segmentation, Operating Modes Instruction Set of 8086 Addressing Modes: Instruction format: Discussion on instruction Set: Groups: data transfer, arithmetic, logic string, branch control transfer, processor control. Interrupts: Hardware and software interrupts, responses and types.	14
IV	Fundamental of Programming: development of algorithms, flowcharts in terms of structures, (series, parallel, if-then-else etc.) Assembler Level Programming: memory space allocation (mother board and user program) Assembler level programs (ASMs) Other Microprocessors: Motorola 6800/MC6809, 65C02, Signetics 2650 etc.	14
V	Peripheral Interfacing: I/O programming: Programmed I/O, Interrupt Driven I/O, DMA I/O interface: serial and parallel communication, memory I/O mapped I/Os. Peripheral Devices: 8237 DMA controller, 8255- Programmable peripheral interface, 8253/8254 Programmable timer/counter 8259 programmable Interrupt Controller.	14

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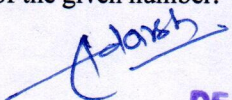
PEOPLE'S UNIVERSITY, BHOPAL***(Applicable for Admitted from Academic Session 2019-20 onwards)*****Programme: Bachelor of Technology****Semester –V****Text Book/References Books/ Websites:**

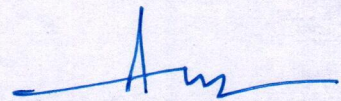
1. A Ditya P Mathur; Introduction to Microprocessor; Tata Mc Graw Hill.
2. M. Rafiquzzaman; Microprocessors- Theory and applications; PHI.
3. B. Ram; Advanced Microprocessor & Interfacing; Tata McGraw Hill.
4. Renu Singh & B.P. Singh.; Microprocessor and Interfacing and applications; New Age International.
5. Hall D.V.; Microprocessors Interfacing; Tata Mc Graw Hill.
6. Liu and Gibson G.A.; Microcomputer Systems: The 8086/8088 Family; Prentice Hall (India)

Suggested List of Laboratory Experiments :- (Expandable):

1. To store 8 bit data in register in 8085 microprocessor.
2. Add two 8 bit numbers in 8085 microprocessor.
3. To study program to clear accumulator then 3 to the accumulator ten times.
4. Program to load the accumulator with the value 55H and compliment accumulator 70 times.
5. To perform addition of two binary numbers of 8 bit length.
6. To find a largest number in a given string.
7. To perform sort a string of bytes in a descending order.
8. To perform the ASCII multiplication.
9. To Study the binary to gray conversion.
10. To find 2's compliment of the given number.


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Programme: Bachelor of Technology

Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
CBEC-505	Communication Network & Transmission Line	L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (35)	Internal (15)	Total (50)
		3	1	1			Min: 40 (D Grade)			Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/Attendance /Quiz- Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	To give knowledge of Transmission Line Theory, passive filters, equalizers and attenuators.
Course Outcome	Student will be able to learn: 1. Transmission Line Theory. 2. To analyze Passive Filters. 3. Network Synthesis. 4. Attenuators And Equalizers Generator. 5. Impedance Matching In High Frequency Lines.

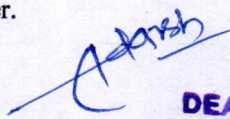
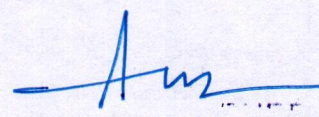
Unit	Contents (Theory)	Marks Weightage
I	Transmission Line Theory: Characteristic Parameters of symmetrical and asymmetrical two port networks and their design: image impedance, iterative impedance, characteristic impedance, propagation coefficient, image transfer coefficient, iterative transfer coefficient, Lattice and Bridged-T networks, reactive matching networks, matching techniques, Insertion Loss, symmetrical and asymmetrical attenuators and their design.	14
II	Passive Filters: Passive LC Filters: Analysis and design of Low pass, high pass, band pass and band elimination filters, m-derived filters, composite filters, Filter specifications, Butterworth approximation, Chebyshev approximation, elliptic function approximation, frequency transformation.	14
III	Network Synthesis: Positive real function, LC, RL, RC, and RLC network synthesis, Foster and Cauer network, minimum positive real function, Brune's method, Bott-Duffin method, Synthesis-Coefficient.	14
IV	Attenuators And Equalizers : Transmission line fundamentals: Lumped parameter equivalent, voltage and current on a transmission line, infinite line, characteristic impedance and propagation constant, waveform distortion, attenuation and phase equalizers, distortion-less line, loading, liner reflection on a line, reflection coefficient, input and transfer impedances, open circuit and short circuit line, reflection factors, reflection loss, insertion loss, T and π equivalents of a line, location of line fault. Construction and design of two wire line and coaxial cable.	14
V	Impedance Matching In High Frequency Lines: Line at radio frequencies, parameters of line and coaxial cable at radio frequencies, dissipation-less line, voltage and current on a dissipation-less line, standing waves, standing wave ratio, input impedance of open circuit and short circuit, power and impedance measurement on lines, eighth-wave, quarter-wave and half wave line, circle diagram, Smith chart, solution of problems sing Smith chart, single and double stub matching .introduction to micro-strip lines and its analysis.	14

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1. J.D. Ryder; Networks and Transmission Lines; 2nd edition, PHI.
2. M.E. Valkenberg; Introduction to Modern Network synthesis; Wiley Eastern Ltd.
3. G.K. Mithal; Network Analysis; Khanna Publishers.
4. Umesh Sinha; Networks and Transmission Lines; Satya Prakashan
5. Suresh; Electric Circuits and Networks; Pearson Education.

Suggested List of Laboratory Experiments :- (Expandable):

1. To study the basics of transmission line.
2. To measuring the primary constants of transmission line.
3. To measuring the input impedance of the transmission line.
4. To measuring the attenuation of transmission line.
5. To measuring the phase displacement between the current and voltage at input of the lines.
6. To measure the frequency characteristics of Line.
7. To perform the signal phase shift along the line.
8. To study the fault localization within line.
9. To Study the m-derived filter.
10. To Study the k-derived filter.


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Programme: Bachelor of Technology

Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBEC-506	TV & Radar Engineering	3	-	1						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/Attendance /Quiz- Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	To give the knowledge of TV & Radar Systems.
Course Outcome	Student will be able to learn: 1. Transmission Line Theory. 2. To analyze Passive Filters. 3. Network Synthesis. 4. Attenuators And Equalizers Generator. 5. Impedance Matching In High Frequency Lines.

Unit	Contents (Theory)	Marks Weightage
I	Introduction of Basic Television System: Scanning principles: sound and picture transmission, scanning process, camera pick-up devices, video signal, transmission and reception of video signals, brightness perception and photometric quantities, aspect ratio and rectangular scanning, persistence of vision and flicker, vertical resolution, the Kell factor, horizontal resolution and video bandwidth, interlaced scanning. Composite Video Signal: Lines and scanning, video signal components, horizontal sync and blanking standards, vertical sync and blanking standards.	14
II	Fundamentals of Colour Television: mixing of colours and colour perception, chromaticity diagram, colour television camera, colour TV signals and transmission, NTSC, SECAM and PAL system, Trinitron picture tube, LCD displays. Television Transmission and Reception: requirement of TV broadcast transmission, design principle of TV transmitters, IF modulation, power output stages, block diagram of TV transmitter, antenna requirements for television system, block schematic and function requirements for television receivers, trends in circuit design, colour television receiver.	14
III	Digital Television Technology: Merits of digital technology, fully digital television system, digital television signals, digitized video parameters, digital video hardware, transmission of digital TV signals, bit rate reduction, digital TV receivers. Other Television Systems: Closed Circuit television system (CCTV), Cable television system (CATV), multiplexed analog component encoding television system (MAC TV), High definition television system (HDTV), High definition multiplexed analog component television (HD-MAC TV).	14
IV	RADAR: The Radar range equation, block diagram and operation, performance factors: prediction of range performance, minimum detectable signal, receiver noise, probability density functions, and signal to noise ratios. Radar cross section of targets, transmitter power, displays-type A and PPI representations and antenna parameters.	14
V	Radar Receivers: The radar receiver, The CW radar: the Doppler effect, FM-CW radar. The Moving Target Indicator (MTI) Radar: delay line cancellers. Other Radar Systems: Synthetic aperture radar, Air Surveillance Radar (ASR), Bistatic radar.	14

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Text Book/References Books/ Websites:-

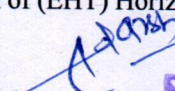
1. R. R. Gulati; Monochrome and Colour Television; New Age International
3. M. Dhake; Television and Video Engineering, 2nd Edition; TMH, New Delhi.
3. P. Z. Peebles, Jr.; Radar Principles; Wiley India Pvt. LTD.

Suggested List of Laboratory Experiments :- (Expandable):

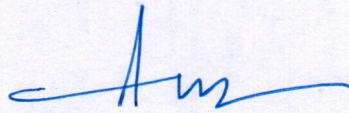
1. To study the circuit description of RF-Section (Tuner section)-color T.V.
2. To study the detail circuit description of video & CHROMA section.-color T.V.
3. To study the detailed circuit description of Horizontal oscillator section and horizontal output section.
4. To study the detailed circuit description of vertical oscillator section and vertical output section.
5. To study the detail circuit description of R-G-B video output section.
6. To study the circuit description of RF-section (Tuner section) - B&W T.V.
7. To study the detail circuit description of VIF section.-B&W T.V.
8. To study the detail circuit description of SIF section/sound output section.-B&W T.V.
9. To study of circuit description of synchronous/Horizontal oscillator section.-B&W T.V.
10. To study of the circuit description of (EHT) Horizontal output section.-B&W T.V.


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Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (35)	Internal (15)	Total (50)	End Sem (35)	Internal (15)	Total (50)
		1	-	6			Min: 20 (D Grade)			Min: 20 (D Grade)

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks:15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05
Practical Internal Max Marks: 15	Lab Performance/ Quiz/Attendance - Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	(a) Understand the concept of Team and its functioning. (b) Hone Public speaking skills. (c) Understand the security set up and management of Border/Coastal areas. (d) Acquire knowledge about an Infantry Battalion organization and its weapons. (e) Acquire knowledge about Indo-Pak Wars fought in 1965 & 1971.
Course Outcomes	Student will be able to learn: 1. Participate in team building exercise and value team work. 2. Improve communication skills by public speaking activities. 3. Understand the security mechanism and management of Border/Coastal areas. 4. Get motivated to join armed forces.

Unit	Contents (Theory)	Marks Weightage
I	Personality Development: (i) Group Discussions –Team work. (ii) Public speaking.	07
II	Border & Coastal Areas: Security Setup and Border/Coastal management in the area.	07
III	Introduction to Infantry Battalion and its Equipment: Organization of Infantry Battalion & its weapons.	07
IV	Military History: Study of Battles of Indo-Pak Wars 1965 & 1971.	14

Note: For NCC-V, 05 credits will be allotted after successful completion of camp.

Text Book/References Books/ Websites:

1. Cadet's handbook, NCC Directorate, MP, CG.
2. Supplementary cadet's handbook, NCC Directorate, MP, CG.

Suggested List of Laboratory Practical (Expandable):

1. **Drill**
 - Ceremonial Drill.
 - Guard Mounting.
2. **Field Craft & Battle Craft** (Contact Hrs. 04)
 - Fire control orders.
 - Types of fire control orders.
 - Fire and Movement- when to use fire and movements tactics, Basic considerations, Appreciation of ground cover, Types of cover, Dead ground, Common Mistakes, Map and air photography, Selection of Fire position and fire control.
3. **Map Reading:** Google Maps & applications.
4. **Weapon Training:** Short Range firing

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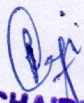
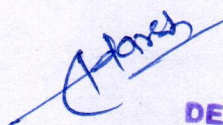
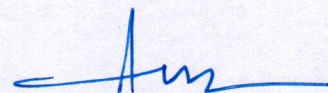
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Semester –V

5. **Social Service and Community Development:** Cadets will participate in various activities throughout the semester e.g., Blood donation Camp, Swachhata Abhiyan, Constitution Day, Jan Jeevan Hariyali Abhiyan, Beti Bachao Beti Padhao etc. as per the requirement and similar announced days- National and State level.
6. **Health & Hygiene:**
 - Yoga- Introduction, Definition, Purpose, Benefits.
 - Asanas-Padamsana, Siddhasana, Gyan Mudra, Surya Namaskar, Shavasana, Vajrasana, Dhanurasana, Chakrasana, Sarvaangasana, Halasana etc.
7. **Obstacle Training:**
 - Obstacle training – Intro, Safety measures, Benefits.
 - Obstacle Course- Straight balance, Clear Jump, Gate Vault, Zig- Zag Balance, High Wall etc.

Note: Examination of this NCC course will be conduct as per NCC head quarter norms in consultation with office of COE, PU.

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PEOPLE'S UNIVERSITY, BHOPAL***(Applicable for Admitted from Academic Session 2019-20 onwards)***Programme: **Bachelor of Technology**

Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-508	Accounting and Finance Management	2	-	-						

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks: 15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	The objective of this course is to familiarize the students with concepts and methods in accounting as a subject in Business Financial Management.
Course Outcomes	Student will be able to learn: 1. To understand Basic accounting concepts. 2. To know system of book banking. 3. To understand depreciation methods. 4. To understand the framework of balance sheet.

Unit	Contents (Theory)	Marks Weightage
I	Accounting: Meaning, scope & relationship with other functional areas, book keeping & accounting.	07
II	Conceptual framework of accounting: Accounting principles, accounting concepts, accounting conventions, systems of books keeping, double entry system of books keeping, journal (Numerical).	07
III	Depreciation Accounting: Concepts causes methods of providing depreciation different assets: Fixed installment method (Numerical), Diminishing balance method (Numerical), Annuity method (Numerical).	07
IV	Final Accounts: Manufacturing account, trading account, profit & loss account, balance sheet and adjustments (Numerical).	07
V	Bank Reconciliation Statement: Objective, Importance & Techniques	07

Text Book/References Books/ Websites:

1. Jain & Narang: Elements of Accounting.
2. S.N. Maheshwari: Fundamentals of Accounting.
3. Shukla, Grewal & Gupta: Advanced Account.

Suggested List of Laboratory Practical (Expandable): Nil

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Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
CBEC-509	IC Application Lab	L	T	P	End Sem Nil	Internal (Nil)	Total	End Sem Nil	Internal (50)	Total (50)
		-	-	2			Nil			Min:20 (D Grade)

Duration of Theory (Externals): Nil

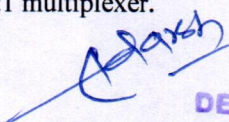
Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance – Max. Marks: 50	

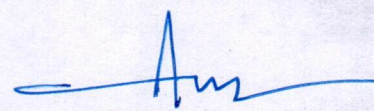
Pre-Requisite	Nil
Course Objective	To find the fundamental knowledge about the fabrication of IC's.
Course Outcomes	Student will be able to learn: 1. To understand the knowledge of Electronic Devices and Circuits analysis 2. To understand the knowledge of switching theory 3. To understand the knowledge of logic design.

Unit	Contents (Theory)	Marks Weightage
I	Electronics IC's: The main aim of this lab is to teach the linear and non-linear applications of operational amplifiers. Students are made familiar with theory and applications of 555 timers. Students are made to Design combinational logic circuits using digital ICs. Students are gain the practical hands on experience by exposing them to various linear and digital IC applications. The students will have an understanding of the concepts involved in various linear integrated circuits and Digital ICs and their various applications.	50

Text Book/References Books/ Websites: Nil**Suggested List of Laboratory Experiments :- (Expandable):****Student should perform & test at least 10 electronic components/instruments related to subjects.**

1. To design Op-amp as Integrator.
2. To design Op-amp as Differentiator
3. To design and obtain the frequency response of second order High Pass Filter (HPF).
4. To construct and study the behavior of logarithmic and antilogarithmic amplifier.
5. To design a Wien-bridge oscillator using operational amplifier.
6. To construct and study the operation of a monostable multivibrator using 555 IC timer.
7. To construct and study the voltage to current convertor.
8. To design & implementation of Boolean Functions, Adder/ Subtractor circuits using gates.
9. Design and Implementation of JK FF, RS FF, D Flip-flops using gates.
10. Design and Implementation of 4:1 multiplexer.


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Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
CBTE-510	Industrial Training	L	T	P	End Sem (Nil)	Internal (Nil)	Total	End Sem (100)	Internal (Nil)	Total (100)
		-	-	1			Nil			Min: 40 (D Grade)

Duration of Theory (Externals): -Nil

Theory Internal- Max Marks: -Nil	Best of Two Mid Semester Test-Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: Nil
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Max. Marks: Nil	

Pre-Requisite	Fundamental Engineering concepts of concern discipline.
Course Objective	The objective of industrial training is to provide to students the feel of the actual working environment and to gain practical knowledge and skills, which in turn will motivate, develop and build their confidence.
Course Outcome	Student will be able to learn: 1. Participate in the projects in industries during his or her industrial training. 2. Describe use of advanced tools and techniques encountered during industrial training and visit. 3. Interact with industrial personnel and follow engineering practices and discipline prescribed in industry. 4. Develop awareness about general workplace behavior and build interpersonal and team skills. 5. Prepare professional work reports and presentations..

Unit	Contents (Theory)	Marks Weightage
I	The Course industrial training is to provide work experience, so that student's engineering knowledge is enhanced and employment prospects are improved. Industrial training of the students is essential to overcome the wide gap between the classroom learning and industrial environment. Industrial Training is a practical course, in which the students should undergo in reputed Private / Public Sector / Government organization / companies as industrial training of minimum FOUR weeks in the semester break after IV semester theory examinations. Training period: Minimum of Four weeks or 30 (Thirty) Days. Evaluation: Fifth semester Companies / Areas covered: Any field related to concern branch / discipline of Engineering. Grading: As per Scheme. Note:. The presentation is evaluated by your class incharge. Report must be submitted during power point presentation. A Viva voce comprising comprehensive questions based on your presentation and training undergone. Etiquettes: Dress properly, behave well, portray good image as a university student, be punctual, observe work ethics, concern for safety, be professional.	100

Text Book/References Books/ Websites: Nil**Suggested List of Laboratory Experiments:- (Expandable): Nil**

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Semester –V

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (50)	Total (50) Min: 20 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-511	Indian Constitution	-	-	-						

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: 50	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 50
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Max. Marks: Nil	

Pre-Requisite	Fluency in English
Course Objective	The objective of this Course is to outline the essential features of the Indian Constitution and to discuss important organs established by it.
Course Outcomes	Student will be able to learn: 1. About the fundamental rights and duties 2. About the institutional arrangement provided by the Constitution.(UG) 3. About the institutional arrangement provided by the Constitution.(SG) 4. About the local administration. 5. About the working of election commission.

Unit	Contents (Theory)	Marks Weightage
I	Introduction: Constitution-meaning of the term; Indian Constitution: Sources and constitutional history; Features: Citizenship; Preamble; Fundamental Rights and Duties; Directive Principles of State Policy.	10
II	Union Government and its Administration: Structure of the Indian Union: Federalism; Centre- State relationship; President: Role; power and position; PM and Council of ministers; Cabinet and Central Secretariat; Lok Sabha; Rajya Sabha; Supreme Court of India.	10
III	State Government and its Administration: Governor: Role and Position; CM and Council of ministers; State Secretariat: Organization; Structure and Functions; High Courts.	10
IV	Local Administration: District's Administration head: Role and Importance; Municipalities: Introduction; Mayor and role of Elected Representative; CEO of Municipal Corporation; Pachayati raj: Introduction; PRI: Zila Pachayat; Elected officials and their roles; CEO Zila Pachayat: Position and role; Block level: Organizational Hierarchy (Different departments); Village level: Role of Elected and Appointed officials; Importance of grass root democracy.	10
V	Election Commission: Role and Functioning; Chief Election Commissioner and Election Commissioners; State Election Commission: Role and Functioning; Institute and Bodies for the welfare of SC/ST/OBC and women.	10

Text Book/References Books/ Websites:

1. Laxmikanth; Indian Polity.
2. Subhash Kashyap; Indian Administration.
3. D.D. Basu; Indian Constitution.
4. Avasti and Avasti; Indian Administration.

Suggested List of Laboratory Practical (Expandable): Nil

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Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBEC-6101	Information Theory and Coding	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test- Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz- Max. Marks: Nil	

Pre-Requisite	Basic Knowledge of Communication system.
Course Objective	Formulate the fundamental concepts of information theory such as entropy, mutual information, channel capacity.
Course Outcome	Student will be able to learn: 1. The measurement of information and errors. 2. The knowledge in designing various source codes and channel codes. 3. To design encoders and decoders for block and cyclic. 4. To understand the significance of codes in various applications 5. To encode Convolution Codes

Unit	Contents (Theory)	Marks Weightage
I	Information Theory: Introduction, Measure of information, Information content of message, Average Information content of symbols in Long Independent sequences, Average Information content of symbols in Long dependent sequences, Markov Statistical Model for Information Sources, Entropy and Information rate of Mark off Sources.	14
II	Source Coding: Encoding of the Source Output, Shannon's Encoding Algorithm, Shannon Fano Encoding Algorithm, Source coding theorem, Prefix Codes, Kraft McMillan Inequality property KMI, Huffman codes.	14
III	Information Channels: Communication Channels, Discrete Communication channels Channel Matrix, Joint probability Matrix, Binary Symmetric Channel, System Entropies. Mutual Information, Channel Capacity, Channel Capacity of Binary Symmetric Channel, Binary Erasure Channel, Muroga's Theorem.	14
IV	Error Control Coding: Introduction, Examples of Error control coding, methods of Controlling Errors, Types of Errors, types of Codes, Linear Block Codes: matrix description of Linear Block Codes, Error detection & Correction capabilities of Linear Block Codes, Single error correction Hamming code, Table lookup Decoding using Standard Array. Binary Cyclic Codes: Algebraic Structure of Cyclic Codes, Encoding using an (n-k) Bit Shift register, Syndrome Calculation, Error Detection and Correction.	14
V	Convolution Codes: Convolution Encoder, Time domain approach, Transform domain approach, Code Tree, Trellis and State Diagram, The Viterbi Algorithm).	14

Text Book/References Books/ Websites:

1. Ranjan Bose; ITC and Cryptography; TMH, II edition, 2007
2. Simon Haykin; Digital Communication; Reprinted. John Wiley India Pvt Ltd, 2008.
3. HariBhat, Ganesh Rao.; Information Theory and Coding; Cengage, 2017.

Suggested List of Laboratory Practical (Expandable): Nil**CHAIRMAN**

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBEC-6102	Artificial Intelligence	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test- Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz- Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content
Course Outcome	Student will be able to learn: 1. Basic foundation of AI and history of AI intelligent agents. 2. Searching for solutions. 3. The knowledge representation issues. 4. Various Inference in first order logic 5. Expert systems.

Unit	Contents (Theory)	Marks Weightage
I	AI Problems: foundation of AI and history of AI intelligent agents, Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.	14
II	Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.	14
III	Knowledge representation issues: predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems. Reasoning under uncertainty, review of probability, Baye's probabilistic interferences and dempstershafer theory.	14
IV	First order logic: Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, Learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods ,Reinforcement Learning.	14
V	Expert systems: Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, expert systems and the internet interacts web, knowledge engineering, scope of knowledge, difficulties, in knowledge acquisition methods of knowledge acquisition, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, societal impacts reasoning in artificial intelligence, inference with rules, with frames: model based reasoning, case based reasoning, explanation & meta knowledge inference with uncertainty representing uncertainty.	14

Text Book/References Books/ Websites:

1. S. Russel and P. Norvig; Artificial Intelligence – A Modern Approach; Second Edition, Pearson Education.

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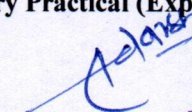
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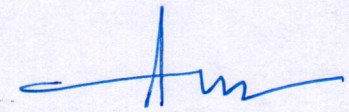
Semester –VI

2. David Poole, Alan Mackworth, Randy Goebel; Computational Intelligence : a logical approach; Oxford University Press..
3. J. Nilsson; Artificial Intelligence: A new Synthesis; Elsevier Publishers.

Suggested List of Laboratory Practical (Expandable): Nil


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Syllabus

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(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: Bachelor of Technology

Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBEC-6103	Digital Image Processing	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz- Max. Marks: Nil	

Pre-Requisite	Nil.
Course Objective	To become familiar with digital image fundamentals.
Course Outcome	Student will be able to learn: 1. Digital Image Fundamentals. 2. Image Enhancement. 3. Image Restoration. 4. Image Segmentation 5. Image Compression and Recognition.

Unit	Contents (Theory)	Marks Weightage
I	Digital Image Fundamentals: Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - Color image fundamentals - RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT	14
II	Image Enhancement: Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.	14
III	Image Restoration : Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering	14
IV	Image Segmentation: Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.	14
V	Image Compression And Recognition: Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.	14

Text Book/References Books/ Websites:

1. Rafael C. Gonzalez, Richard E. Woods; Digital Image Processing; Pearson, Third Edition,
2. Anil K. Jain; Fundamentals of Digital Image Processing; Pearson

Suggested List of Laboratory Practical (Expandable): Nil

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PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*

Programme: Bachelor of Technology

Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
CBTE-6104	Neural Network	L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total
		3	-	-			Min: 40 (D Grade)			(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Attendance /Quiz - Max. Marks: Nil	

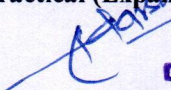
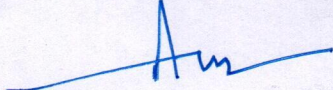
Pre-Requisite	Nil
Course Objective	To make students familiar with basic concepts and tool used in neural network.
Course Outcomes	Student will be able to learn: 1. The structure of a neuron including biological and artificial. 2. Ability to learning in network. 3. Single layer feedback Networks. 4. Auto associative memory. 5. The Self organizing networks.

Unit	Contents (Theory)	Marks Weightage
I	Introduction: Structure of biological neurons relevant to ANNs., Models of ANNs; Feedforward & feedback networks; learning rules; Hebbian learning rule, perception learning rule, delta learning rule, Widrow-Hoff learning rule, correction learning rule, Winner-take all learning rule, etc.	14
II	Single layer Perception Classifier and Multi-layer Feed forward Networks: Classification model, Features & Decision regions; training & classification using discrete perceptron, algorithm, single layer continuous perceptron networks for linearly separable classifications, linearly non-separable pattern classification, Delta learning rule for multi-perceptron layer, Generalized delta learning rule, Error back-propagation training, learning factors, Examples.	14
III	Single layer feedback Networks: Basic Concepts, Hopfield networks, Training & Examples. Associative memories: Linear Association, Basic Concepts of recurrent.	14
IV	Auto associative memory: Retrieval algorithm, storage algorithm; By directional associative memory, Architecture, Association encoding & decoding, Stability.	14
V	Self organizing networks: UN supervised learning of clusters, winner-take-all learning, recall mode, Initialization of weights, separability limitations.	14

Text Book/References Books/ Websites:

1. Jacek M. Zurada; Introduction to Artificial Neural systems; Jaico Publ. House.
2. Simon Haykin; Neural Networks :A Comprehensive formulation; AW.
3. Kosko; Neural Networks; PHI.

Suggested List of Laboratory Practical (Expandable): Nil


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Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	End Sem	Internal	Total
CBEC-602	Industrial Electronics	3	1	-	(70)	(30)	Min: 40 (D Grade)	(Nil)	(Nil)	(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz- Max. Marks: Nil	

Pre-Requisite	To have knowledge of Electronics circuits.
Course Objective	Introduced to various electronic components and systems used in modern industry..
Course Outcome	Student will be able to learn: 1. To understand about the rectifiers. 2. The AC voltage regulators and cyclo-converters 3. To get to know about the inverters & choppers and industrial applications. 4. The principle of Step-Down and Step-Up Chopper. 5. The residential and Industrial Application.

Unit	Contents (Theory)	Marks Weightage
I	Rectifiers: Uncontrolled, Half-Controlled and Fully Controlled Single-Phase and Three-Phase Rectifiers for Resistive and Resistive-Inductive Load, Use of Free-Wheel Diode, Dual Converter, Input and Output Performance Parameters, Heat Sink.	14
II	AC Voltage Regulators and Cyclo-converters: Principle of On-Off Control and Phase Control, Single-Phase Voltage Controller for Resistive and Resistive-Inductive Load, Sequence Control of AC Voltage Controller, Three-Phase Voltage Regulator. Principle of Cyclo-converter, Single-Phase to Single-Phase Step-up and Step-Down Cyclo-Converter, Three-Phase to Single-Phase and Three-Phase to Three-Phase Cyclo-Converter.	14
III	Inverters: Single-Phase Bridge Inverter, Three-Phase Inverters-180° and 120° Conduction Mode, Voltage Control of Single-Phase Inverters-Single, Multiple, Sinusoidal, Modified Sinusoidal Pulse-Width Modulation, Advanced Modulation Techniques- Trapezoidal, Staircase, Stepped, Harmonic Injection and Delta Modulation. Induction Motor AC Drives.	14
IV	Chopper: Principle of Step-Down and Step-Up Chopper, Converter Classification, Multi-Phase Chopper, Switching-Mode Regulators-Buck, Boost, Buck-Boost and Cuk Regulators, DC Drives.	14
V	Residential and Industrial Application: Space Heating and Air Conditioner, High Frequency Fluorescent Lighting, Electronic Timer, Battery Charger, Switch-Mode-Power- Supply (SMPS), Uninterruptible Power Supply (UPS), Static Switches, Induction Heating, Electric Welding, Introduction of HVDC and FACTS.	14

Text Book/References Books/ Websites:

1. Mohan, Undeland and Robbins; Power Electronics; Wiley-India Edition
2. P. S. Bimbhra; Power Electronics; Khanna Publisher.
3. Biswanath Paul; Industrial Electronics; PHI Learning

Suggested List of Laboratory Experiments: (Expandable): Nil


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Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBEC-603	Digital Signal Processing	3	1	1						

Duration of Theory (Externals): 3 Hours

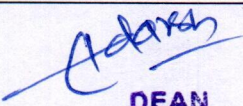
Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/Attendance /Quiz- Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	This subject clears mainly the working knowledge of design, implementation and analysis DSP systems.
Course Outcome	Student will be able to learn: 1. To study about discrete time systems and to learn about FFT algorithms.. 2. To study the design techniques for FIR and IIR digital filters. 3. The properties of random signal. 4. The efficient Computation of the DFT. 5. The operation digital Filters Design Techniques.

Unit	Contents (Theory)	Marks Weightage
I	Discrete-Time Signals and Systems: Discrete-Time Signals, Discrete-Time Systems, Analysis of Discrete-Time Linear Time-Invariant Systems, Discrete Time systems described by Difference Equation, Implementation of Discrete-Time Systems, Signal flow Graph representation of digital network, matrix representation.	14
II	Laplace Transform: Laplace Transform and its inverse: Definition, existence conditions, Region of Convergence and properties, Application of Laplace transform for the analysis of continuous time LTI system (stability etc.) Significance of poles & zeros. The z-Transform: The Direct z-transform, Properties of the z-transform, Rational z-transforms, Inversion of the z-transform, analysis of Linear Time-Invariant systems in the z-domain.	14
III	Frequency Analysis of Discrete Time Signals: Discrete Fourier series (DFS), Properties of the DFS, Discrete Fourier Transform (DFT), Properties of DFT, Two dimensional DFT, Circular Convolution.	14
IV	Efficient Computation of the DFT: FFT algorithms, decimation in time algorithm, Decimation in frequency algorithm, Decomposition for 'N' composite number. DSP Processors: Brief Introduction of Advanced DSP Processors (e.g. TMS320).	14
V	Digital Filters Design Techniques: Design of IIR and FIR digital filters, Impulse invariant and bilinear transformation, windowing techniques- rectangular and other windows, Examples of FIR filters, design using Windowing.	14



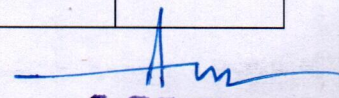
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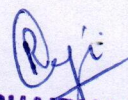
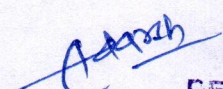
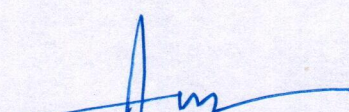
Department: Electronics & Communication Engineering

PEOPLE'S UNIVERSITY, BHOPAL***(Applicable for Admitted from Academic Session 2019-20 onwards)*****Programme: Bachelor of Technology****Semester –VI****Text Book/References Books/ Websites:-**

1. A.V. Oppenheim and R. W. Schaffer; Digital Signal Processing; Prentice Hall.
2. Ingle VK and Proakis John G ; Digital Signal Processing A MATLAB based Approach; Cengage Learning
3. John. G. Proakis and Monolakis; Digital Signal Processing; Pearson Education.
4. Salivahanan and Vallavraj; Digital Signal Processing; Mc Graw Hill

Suggested List of Laboratory Experiments :- (Expandable):

1. To Plot Pole Zero from transfer function.
2. Study of Circular Convolution.
3. Study of Sampling Theorem in Time domain.
4. To find the frequency contents of the speech signal using FFT.
5. To design IIR filter using impulse invariant method.
6. To apply FIR LPF to filter the known signal.
7. To design analog filter (low pass, high pass).
8. To design IIR filter using bilinear transformation.
9. To develop a program for computing discrete Fourier transforms.
10. To develop a program for realization of IIR digital filter.


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Programme: Bachelor of Technology

Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
CBEC-604	Microwave Engineering	L	T	P	External (70)	Internal (30)	Total (100)	External (35)	Internal (15)	Total (50)
		3	1	1			Min: 40 (D Grade)			Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/Attendance /Quiz- Max. Marks: 15	

Pre-Requisite	Basic knowledge of electromagnetic theory.
Course Objective	To understand the RF/microwave analysis methods and design techniques
Course Outcome	Student will be able to learn: 1. To understand how microwaves transmits in different modes and medium. 2. To know about microwave components and scattering parameters. 3. To understand microwave solid state devices and application. 4. To understand microwave vacuum tube devices. 5. To understand microwave measurements devices.

Unit	Contents (Theory)	Marks Weightage
I	Microwave Transmission System: General representation of E M field in terms of TEM, TE and TM components, Uniform guide structures, rectangular wave guides, Circular Wave guides, Solution in terms of various modes, Properties of propagating and evanescent modes, Dominant modes, Normalized model voltages and currents, Power flow and energy storage in modes frequency range of operation for single mode working, effect of higher order modes, Strip line and micro strip lines general properties, Comparison of coaxial, Micro strip and rectangular wave guides in terms of band width, power handling capacity, economical	14
II	Microwave Networks and Component: Transmission line ports of microwave network, Scattering matrix, Properties of scattering matrix of reciprocal, nonreciprocal, loss less, Passive networks, Examples of two, three and four port networks, wave guide components like attenuator, Phase shifters and couplers, Flanges, Bends, Irises, Posts, Loads, Principle of operation and properties of E-plane, H-plane Tee junctions of wave guides, Hybrid T, Multi-hole directional coupler, Directional couplers, Microwave resonators- rectangular. Excitation of wave guide and resonators by couplers. Principles of operation of nonreciprocal devices, properties of ferrites, Isolators and phase shifters.	14
III	Microwave Solid State Devices and Application: PIN diodes, Properties and applications, Microwave detector diodes, detection characteristics, Varactor diodes, parametric amplifier fundamentals, Manley-Rowe power relation MASER, LASER , Amplifiers, Frequency converters and harmonic generators using Varactor diodes, Transferred electron devices, Gunn effect, Various modes of operation of Gunn oscillator, IMPATT, TRAPATT and BARITT.	14
IV	Microwave Vacuum Tube Devices: Interaction of electron beam with electromagnetic field, power transfer condition. Principles of working of two cavity and Reflex Klystrons, arrival time curve and oscillation conditions in reflex klystrons, mode-frequency characteristics. Effect of repeller voltage variation on power and frequency of output. Principle of working of magnetrons. Electron dynamics in planar and cylindrical magnetrons, Cutoff magnetic field, Resonant cavities in magnetron, Π -mode operation Mode separation techniques, Rising sun	14

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PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*Programme: **Bachelor of Technology**

Semester –VI

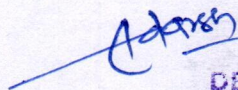
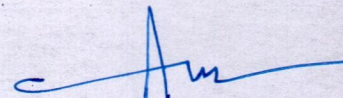
	cavity and strapping. Principle of working of TWT amplifier. Slow wave structures, Approximate gain relationship in forward wave TWT.	
V	Microwave Measurements: Square law detection, Broadband and tuned detectors. Wave-guide probes, Probe and detector mounts, Slotted line arrangement and VSWR meter, Measurement of wave-guide impedance at load port by slotted line, Microwave bench components and source modulation. Measurement of scattering matrix parameters, High, Medium and low-level power measurement techniques, Characteristics of bolometers, bolometer mounts, Power measurement bridges, Microwave frequency measurement techniques, calibrated resonators (transmission and absorption type). Network Analyzer and its use in measurements.	14

Text Book/References Books/ Websites:

1. Y. S. Liao; Microwave Devices; PHI.
2. R. E. Collins; Foundations of Microwave Engineering; 2nd Edition, Wiley Publications
3. J.H. Reich; Microwave Principles; East West Press.
4. D. M. Pozar; Microwave Engineering; 3rd Edition, Wiley Publications

Suggested List of Laboratory Experiments :- (Expandable):

1. To Study the Magic Tee.
2. To Study the Isolator.
3. To Study the Circulator.
4. To determine the standing wave ratio and reflection coefficient.
5. To Study the attenuators.
6. To study the function of multihole directional coupler.
7. To Study the characteristics of Gunn diode.
8. To Study the characteristics of reflex klystron tube and to determine its electronic tuning range.
9. To determine the frequency and wavelength in a rectangular waveguide working on TE₁₀ mode.
10. To Measure the unknown impedance with smith chart.


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PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*

Programme: Bachelor of Technology

Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100) Min: 40 (D Grade)	External (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBEC-605	Microcontroller & Embedded System	2	-	1						

Duration of Theory (Externals): 3 Hours

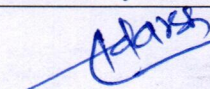
Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/Attendance /Quiz- Max. Marks: 15	

Pre-Requisite	Basic knowledge of Microprocessors and computers.
Course Objective	To experience to integrate hardware and software for microcontroller applications systems.
Course Outcome	Student will be able to learn: 1. The internal architecture and interfacing of different peripheral devices with Microcontrollers. 2. To write the programs for microcontroller. 3. To understand the design concept of embedded systems. 4. The 8051 Interfacing and Applications. 5. The Embedded Systems.

Unit	Contents (Theory)	Marks Weightage
I	Microprocessors and Microcontroller: Introduction, Microprocessors and Microcontrollers, A Microprocessors survey. RISC & CISC CPU Architectures, Harvard & Von-Neumann CPU architecture. The 8051 Architecture: Introduction, 8051 Microcontroller Hardware, Input / Output Pins, Ports and Circuits External Memory, Counter and Timers, Serial Data Input / Output, Interrupts.	14
II	Addressing Modes and Operations: Introduction, Addressing modes, External data Moves, Code Memory, Read Only Data Moves / Indexed Addressing mode, PUSH and POP Opcodes, Data exchanges, Example Programs; Byte level logical Operations, Bit level Logical Operations, Rotate and Swap Operations, Example Programs. Arithmetic Operations: Flags, Incrementing and Decrementing, Addition, Subtraction, Multiplication and Division, Decimal Arithmetic, Example Programs.	14
III	Jump and Call Instructions: The JUMP and CALL Program range, Jumps, calls and Subroutines, Interrupts and Returns, More Detail on Interrupts, Example Problems 8051 Serial Communication: Basics of Serial Communication, 8051 connections to RS-232, 8051 Serial communication Programming, Programming the second serial port, Serial port programming in C.	14
IV	8051 Interfacing and Applications: Interfacing 8051 to LCD, Keyboard, parallel and serial ADC, DAC, Stepper motor interfacing, DC motor interfacing and PWM. Other Microcontrollers: Study of MCS-51, ATMEL 89c51/89s52, PIC-16F84XX/16F87XX.	14
V	Embedded Systems: Introduction, Classification, Processors, Hardware Units, Software Embedded into System, Applications and Products of Embedded Systems, Structural Units in Processor, Memory Devices, I/O Devices, Buses, Interfacing of Processor Memory and I/O Devices, Case Study of an Embedded System for a Smart Card.	14



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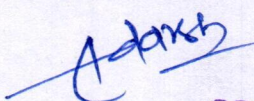
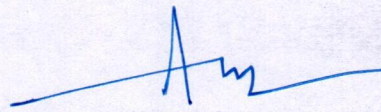
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PEOPLE'S UNIVERSITY, BHOPAL***(Applicable for Admitted from Academic Session 2019-20 onwards)*****Programme: Bachelor of Technology****Semester –VI****Text Book/References Books/ Websites:-**

1. Kenneth J. Ayala; The 8051 Microcontroller Architecture, Programming & Applications; 2e, Penram International, 1996 /Thomson Learning 2005.
2. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; the 8051 Microcontroller and Embedded Systems – using assembly and C; PHI, 2006 / Pearson, 2006.
3. Dr.Ramani Kalpathi and Ganesh Raja; "Microcontroller and its applications", Sanguine Technical publishers, Bangalore-2005.

Suggested List of Laboratory Experiments :- (Expandable):

1. To study the development tools for PIC Microcontroller programme and architecture.
2. Write an assembly language programme to add, subtract, and multiply by Atmel microcontroller.
3. To study and analyze the interfacing of 16×2 LCD.
4. To study of implementation, analysis and interfacing of seven segment display.
5. To study of implementation of stepper motor angle control.
6. To study of implementation of DC motor control using PWM method.
7. To study and observation of position control of servo motor.
8. To study implementation and programming of pressure measurement.
9. To study implementation and programming of temperature measurement.
10. To study PWM based voltage regulator using PIC Microcontroller.


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Programme: Bachelor of Technology

Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-606	Human Resource Management	2	-	-						

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks: 15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05
Practical Internal Max Marks: Nil	Lab Performance/Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	The objective of the course is to acquaint students with the techniques and principles to manage human resource of an organization.
Course Outcomes	Student will be able to learn: 1. To understand the basis concept of HRM. 2. To learn the techniques for the acquisition of Human Resource. 3. To understand the concept of training and development. 4. To understand the factors responsible for performance appraisal. 5. Human Resource Maintenance.

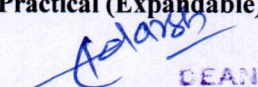
Unit	Contents (Theory)	Marks Weightage
I	Introduction: Human Resource Management: Definition, Nature and Scope of Human Resources Management, Functions Role Competencies of HR Manager, HR Policies, HRM vs HRD. Emerging Challenges of Human Resource Management.	07
II	Acquisition of Human Resource: Human Resource Planning-Definition, Objective, Significance, Process of Human Resources Planning, Factor influencing HRP job analysis-job description and job specialization; Recruitment-process, Methods, Sources, Selection-Concept and process; Test and interview; placement and induction & Orientation.	07
III	Training and Development: Concept and Importance; Identifying Training and Development Needs; Training Programmes, Types of Training , Evaluating Training Effectiveness; Training Process Outsourcing; Management Development; Career Development, Managing employee well being and concept of work life balance and quality of work life.	07
IV	Performance Appraisal: Nature, objectives and importance; Techniques and systems of performance appraisal; performance appraisal forms potential appraisal and employee counseling; well being and concept of work life balance and quality of work life.	07
V	Maintenance: Employee health and safety; employee welfare; social security; Employer-Employee relations-an over view; concept of redeployment, redundancy, attrition, VRS, downsizing, layoffs and retrenchment, ethics and HRM.	07

Text Book/References Books/ Websites:

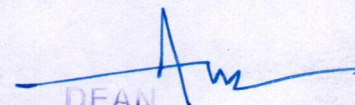
1. Bohlendar and Snell; Principal of Human Resource Management; Cengage Learning.
2. Neeru Kapoor; Human Resource Management, Dhanpat Rai & Co.; Delhi.
3. Robert L. Mathis and John H. Jackson; Human Resource Management; PHI Learning.

Suggested List of Laboratory Practical (Expandable): Nil


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Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
CBTE-607	NCC-VI	L	T	P	End Sem (35)	Internal (15)	Total (50)	End Sem (35)	Internal (15)	Total (50)
		2	-	1			Min: 20 (D Grade)			Min: 20 (D Grade)

Duration of Theory (Externals): 2 Hours

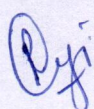
Theory Internal- Max Marks:15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05
Practical Internal Max Marks: 15	Lab Performance/ Quiz/Attendance - Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	1. Get acquainted about counselling process its need and importance. 2. Know about SSB procedure and different tasks and tests. 3. Know about the conduction during the interview. 4. Understand the security challenges & role of cadets in Border Areas. 5. Know about the modes of entry in Armed forces, CAPF & police. 6. Understand the life history & leadership qualities of great generals. 7. Learn about 1999 Kargil war. 8. Acquire the knowledge about various wars and their heroes. 9. Know about various components of communication process.
Course Outcomes	Student will be able to learn: 1. Get motivated to join Armed forces, police & CAPF. 2. Write their CV effective and appealing. 3. Face SSB interview effectively in their future. 4. Understand individual responsibilities & role in meetings the security challenges on Border/Coastal areas. 5. Imbibe the feeling of patriotism. 6. Communicate more effectively.

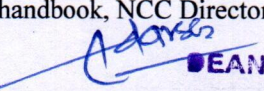
Unit	Contents (Theory)	Marks Weightage
I	Personality Development: (i) Career Counselling. (ii) SSB Procedure. (iii) Interview Skills	07
II	Border & Coastal Areas: Security Challenges & Role of cadets in Border management.	07
III	Armed Forces : Modes of Entry into Army, Police and CAPF.	07
IV	Military History : (i) Biographies of Renowned Generals. (ii) War Heroes : Param Veer Chakra Awardees. (iii) Study of Battles of Kargil. (iv) War Movies.	07
V	Communication: Introduction to Communication & Latest Trends.	07

Text Book/References Books/ Websites:

1. Cadet's handbook, NCC Directorate, MP, CG.
2. Supplementary cadet's handbook, NCC Directorate, MP, CG.

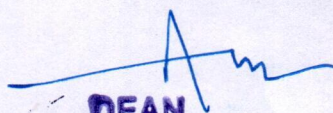


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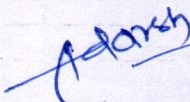
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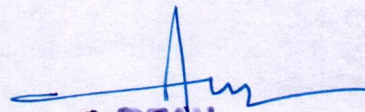
1. Drill
 - Ceremonial Drill.
 - Guard of Honour.
2. Weapon Training (WT): Short Range firing.
3. Map Reading (MR): Google maps and Applications.
4. Field Craft & Battle Craft (FCBC): Knots, Lashing and Stretchers.
5. Social Service and Community Development (SSCD) : Cadets will participate in various activities throughout the semester e.g., Blood donation Camp, Swachhata Abhiyan, Constitution Day, Jan Jeevan Hariyali Abhiyan, Beti Bachao Beti Padhao etc as per the requirement and similar announced days-National and State level.
6. Introduction of Infantry Weapons & Equipment (INF): Characteristics of 5.56MM INSAS Rifle, Ammunition, Fire Power, Stripping, Assembling & Cleaning Practice.
7. Communication (COM)
 - Basic Radio Telephony (RT) Procedure.
 - Introduction, Advantages, Disadvantages, Need for standard procedures.

Note: Examination of this NCC course will be conduct as per NCC head quarter norms in consultation with office of COE, PU.


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PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*

Programme: Bachelor of Technology

Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-608	Company and Compensation Law	2	-	-						

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks: 15	Best of Two Mid Semester Test – Max Marks: 10	Assignment/Quiz/Attendance - Max. Marks: 05
Practical Internal Max Marks: Nil	Lab Performance/Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Fluency in English.
Course Objective	The objective of this course is to teach students about the origin, management and winding up of companies. Students will also learn about social security legislations.
Course Outcomes	Student will be able to learn: 1. Basic concepts of company law. 2. Memorandum of Association and Articles of Association. 3. Conduct meeting and its documentations. 4. Basic concepts of compensation law. 5. Social Welfare Legislations.

Unit	Contents (Theory)	Marks Weightage
I	Introduction: Characteristics of a company; lifting of corporate veil; types of companies including one person company, small company; formation of company –promoters, their legal position, pre-incorporation contract and provisional contracts; online registration of a company.	07
II	Documents and Shares: Memorandum of association, articles of association, prospectus, shelf and red herring prospectus, misstatement in prospectus; issue, allotment and forfeiture of share, Debentures, transmission of shares, buyback; issue of bonus shares.	07
III	Management and Meetings: Classification of directors, women directors, independent director, small shareholder's director; disqualifications, director identity number (DIN); appointment; legal positions, powers and duties; removal of directors; key managerial personnel, meetings of shareholders and board; types of meeting, convening and conduct of meetings, postal ballot, meeting through video conferencing, e-voting.	07
IV	Compensation Law: Employees State Insurance Act, 1948; Minimum Wages Act, 1948; Employees' Compensation Act, 1923.	07
V	New Developments in Compensation Law: Code on Social Security 2020: History, Significance and Important Provisions.	07

Text Book/References Books/ Websites:

1. K.L Malik ; Industrial Laws and Labour Laws; Eastern Book Company; Lucknow.
2. J.P. Sharma, J.P.; An Easy Approach to Company and Compensation Laws; Ane Books Pvt Ltd; New Delhi.
3. S.C. Srivastava ; Industrial Relations & Labour Laws; Vikas Publishing House (P) Ltd.
4. Companies Act and Corporate Laws, Bharat Law House Pvt Ltd, New Delhi.
5. Company Law Digest, Bharat Law House Pvt Ltd, New Delhi.

Suggested List of Laboratory Practical (Expandable): Nil

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Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (Nil)	Internal (50)	Total (50) Min: 20 (D Grade)
CBEC-609	Verilog HDL	-	-	1						

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

Pre-Requisite	Basic knowledge of programming.
Course Objective	To know the basic language features of Verilog HDL and the role of HDL in digital logic design
Course Outcomes	Student will be able to learn: 1. To design and develop the combinational and sequential circuits using behavioral modeling. 2. To solving algorithmic state machines using hardware description language 3. The memorizing the advantages of programmable logic devices and their description in Verilog

Unit	Contents (Theory)	Marks Weightage
I	Introduction to Logic Design with Verilog : Structural models of combination logic, logic simulation, design verification, test methodology, propagation delay, truth table models of combinational and sequential logic with verilog modules, ports, gate types, gate delays, dataflow modelling, continuous assignments delays, expressions, operators, operands, operator types. Logic Design With Behavioral Models of Combinational And Sequential Logic : Behavioral modeling, data types for behavioral modeling, behavioral models of combinational logic, propagation delay and continuous assignments, latches and level sensitive circuits in verilog, cyclic behavioural models of flip flops and latches, cyclic behavior and edge detection, a comparison of styles for behavioral modeling.	50

Text Book/References Books/ Websites:

1. Michael D Ciletti; Advanced Digital Design with the VERILOG HDL;2ND Edition, PHI, 2009
2. Samir Palnitkar; Verilog HDL, 2nd edition; Pearson Education, 2003.

Suggested List of Laboratory Experiments (Expandable):-

1. Write Verilog program for the following combinational design along with test bench to verify the design:
 - a. 2 to 4 decoder realization using NAND gates only (structural model)
 - b. 8 to 3 encoder with priority and without priority (behavioural model)
 - c. 8 to 1 multiplexer using case statement and if statements
 - d. 4-bit binary to gray converter using 1-bit gray to binary converter 1-bit adder and subtractor.
2. Model in Verilog for a full adder and add functionality to perform logical operations of XOR, XNOR, AND and OR gates. Write test bench with appropriate input patterns to verify the modeled behaviour.
3. Write Verilog code for SR, D and JK and verify the flip flop.
4. Write Verilog code for 4-bit BCD synchronous counter

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PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*Programme: **Bachelor of Technology**

Semester –VI

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem	Internal	Total	End Sem	Internal	Total
CBTE-610	Universal Human Ethics	2	1	-	(Nil)	(100)	Min: 40 (D Grade)	(Nil)	(Nil)	(Nil)

Duration of Theory (Internal): Nil

Theory Internal- Max Marks: 100	Best of Two Mid Semester Test – Max Marks: -50	Assignment/Quiz/Attendance - Max. Marks: 50
Practical Internal Max Marks: Nil	Lab Performance / Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	- To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings. - To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way. - To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.
Course Outcomes	Student will be able to learn: - To start exploring themselves: get comfortable with each other and with the teacher; they start appreciating the need and relevance for the course. - Their desires and are able to see that all physical facility they are required for a limited time in a limited quantity. - The natural acceptance and see that respect is right evaluation, and only right evaluation leads to fulfillment in relationship. - Differentiate between the characteristics and activities of different orders and study the mutual fulfillment among them, feel confident that they can understand the whole existence; nothing is a mystery in this existence. - Grasp the right utilization of their knowledge in their streams of Technology/Engineering to ensure mutual fulfillment.

Unit	Contents (Theory)	Marks Weightage
I	Introduction to Value Education: Understanding Value Education, Self-exploration as the Process for Value Education ,Sharing about Oneself ,Continuous Happiness and Prosperity – the Basic Human Aspirations, Right Understanding, Relationship and Physical Facility ; Exploring Human Consciousness , Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations ,Exploring Natural Acceptance.	20
II	Harmony in the Human Being : Understanding Human being as the Co-existence of the Self and the Body ,Distinguishing between the Needs of the Self and the Body ,Exploring the difference of Needs of Self and Body ,The Body as an Instrument of the Self, Understanding Harmony in the Self , Exploring Sources of Imagination in the , Harmony of the Self with the Body , Programme to ensure self-regulation and Health.	20
III	Harmony in the Family and Society : Harmony in the Family – the Basic Unit of Human Interaction, Values in Human-to-Human Relationship, 'Trust' – the Foundational Value in Relationship, Exploring the Feeling of Trust, 'Respect' – as the Right Evaluation , Exploring the Feeling of Respect , Understanding Harmony in the Society, Vision for the Universal Human Order , Exploring Systems to fulfill Human Goal.	20

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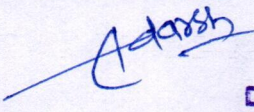
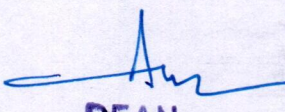
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IV	Harmony in the Nature/Existence: Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature, Exploring the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence, Exploring Co-existence in Existence.	20
V	Implications of the Holistic Understanding – a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct , Exploring Ethical Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Exploring Humanistic Models in Education, Holistic Technologies, Production Systems and Management Models Typical Case Studies, Strategies for Transition towards Value-based Life and Profession, Exploring Steps of Transition towards Universal Human Order.	20

Text Book/References Books/ Websites:

- 1.R.R Gaur; R Sangal; G P Bagaria; A foundation course in Human Values and professional Ethics; Excel books; New Delhi.
2. B L Bajpai; Indian Ethos and Modern Management; New Royal Book Co.
3. A.N. Tripathy; Human Values; New Age International Publishers.
4. Value Education websites, <http://uhv.ac.in>.

Suggested List of Laboratory Practical (Expandable): Nil

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PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*

Programme: Bachelor of Technology

Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBEC-7101	Cellular & Mobile Communication	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test- Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz- Max. Marks: Nil	

Pre-Requisite	Basic Knowledge of Communication system.
Course Objective	To understand mobile radio communication principles and to study the recent trends adopted in cellular systems and wireless standards
Course Outcome	Student will be able to learn: 1. The introduction to cellular mobile system. 2. The knowledge in interference & antenna system. 3. To know cell coverage for signal and traffic. 4. To understand frequency management and channel assignment 5. To understand digital cellular system.

Unit	Contents (Theory)	Marks Weightage
I	Introduction: Introduction to cellular mobile system and concepts of GSM, a basic cellular system, performance criteria, Uniqueness of mobile radio environment, Operation of cellular systems, Planning of cellular system. Elements of Cellular Radio System Design: General description of problem, Concept of frequency reuse, channels, Co channel interference, reduction factor, Hand off mechanisms, Cell splitting, Consideration of the components of cellular systems.	14
II	Interference & Antenna System: Co-channel Interference, real time co-channel interference measurement at mobile radio transceivers, Design of antenna system - Omni directional and directional, Lowering the antenna height, Reduction of co-channel interference, Umbrella-Pattern effect, Diversity receiver, Designing a system to serve a predefined area that experiences Co-Channel Interference. Types of Non co-channel interference- adjacent channel Interference, Near-End-Far-End interference, Effects on Near-End mobile units, Cross-Talk, Effects on coverage and interference by applying power decrease, antenna height decrease, Beam Tilting, Effects of cell site Components, Interference between systems, UHF TV Interference, long distance interference.	14
III	Cell Coverage for Signal and Traffic : General introduction, Obtaining the mobile point-to-point model, Propagation over water or flat open area, foliage loss, propagation in near in distance, long distance propagation, point-to-point prediction model, Cell site antenna heights and signal coverage cells, Mobile-to-mobile propagation. Cell site antennas and mobile antennas: Equivalent circuits of antennas, Gain and Pattern Relationship, Sum and Difference patterns, Antennas at cell site, mobile antennas.	14

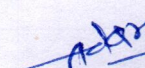

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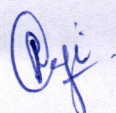
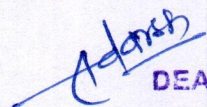
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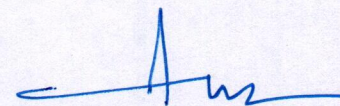
IV	Frequency Management and Channel Assignment: Frequency management, Frequency spectrum utilization, Setup channels, Fixed channels assignment, Non-fixed channel assignment algorithms, Traffic and channel assignment. Handoffs and Dropped Calls: Types of Handoff, Initiation of Handoff, Delaying a Handoff, Forced Handoff, Queuing of Handoff, Power-Difference Handoff, Mobile Assisted Handoff and Soft Handoff, Cell-site Handoff and Intersystem Handoff, Dropped Call Rate.	14
V	Digital Cellular System: GSM, Architecture (working aspects of BTS & MSC), Layer Modeling, Transmission, GSM channels and Channel Modes, Multiple Access Scheme: CDMA, Terms of CDMA systems, output power limits and control, Modulation characteristics, Call processing, Hand off procedures. Miscellaneous Mobile Systems: TDD Systems, Cordless Phone, PDC, PCN, PCS, Non Cellular Systems, Mobile Integrated Radio Systems, Mobile Satellite Communication.	14

Text Book/References Books/ Websites:

1. W.C.Y. Lee; Mobile Cellular Telecommunications; Tata McGraw Hill, 2nd Edn., 2006.
2. Gordon L. Stuber; Principles of Mobile Communications; Springer International 2nd Edition, 2007.
3. G Sasibhushana Rao; Mobile Cellular Communication; Pearson.

Suggested List of Laboratory Experiments :- (Expandable): Nil

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Programme: Bachelor of Technology

Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBEC-7102	Wireless & Ad-hoc Network	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test- Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz- Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	Explain fundamental principles of Ad-hoc Networks.
Course Outcome	Student will be able to learn: 1. Ad-hoc wireless networks introduction. 2. Routing protocols for ad-hoc wireless networks. 3. Multicast routing in ad-hoc wireless networks introduction. 4. Transport layer and security protocols for ad-hoc networks 5. Quality of service and energy management in ad-hoc wireless networks.

Unit	Contents (Theory)	Marks Weightage
I	Ad-hoc Wireless Networks Introduction: Issues in Ad-hoc Wireless Networks, Ad-hoc Wireless Internet; MAC Protocols for Ad-hoc Wireless Networks: Introduction, Issues in Designing a MAC Protocol, Design Goals of MAC Protocols, Classification of MAC protocols, Contention-Based Protocols, Contention-Based Protocols with Reservation Mechanisms, Contention-Based Protocols with Scheduling Mechanisms, MAC Protocols that Use Directional Antennas.	14
II	Routing Protocols for Ad-hoc Wireless Networks: Introduction, Issues in Designing a Routing Protocol for Ad-hoc Wireless Networks; Classification of Routing Protocols; Table Driven Routing Protocols; On-Demand Routing Protocols, Hybrid Routing Protocols, Hierarchical Routing Protocols and Power-Aware Routing Protocols.	14
III	Multicast Routing in Ad-hoc Wireless Networks Introduction: Issues in Designing a Multicast Routing Protocol, Operation of Multicast Routing Protocols, An Architecture Reference Model for Multicast Routing Protocols, Classifications of Multicast Routing Protocols, Tree-Based Multicast Routing Protocols and Mesh-Based Multicast Routing Protocols.	14
IV	Transport Layer and Security Protocols for Ad-hoc Networks: Introduction, Issues in Designing a Transport Layer Protocol; Design Goals of a Transport Layer Protocol; Classification of Transport Layer Solutions; TCP over Transport Layer Solutions; Other Transport Layer Protocols for Ad-hoc Networks; Security in Ad-hoc Wireless Networks, Issues and Challenges in Security Provisioning, Network Security Attacks.	14
V	Quality of Service and Energy Management in Ad-hoc Wireless Networks: Introduction, Issues and Challenges in Providing QoS in Ad-hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Network Layer Solutions; Energy Management in Ad-hoc Wireless Networks: Introduction, Need for Energy Management in Ad-hoc Wireless Networks, Classification of Energy Management Schemes, Battery Management Schemes, Transmission Management Schemes, System Power Management Schemes.	14

Text Book/References Books/ Websites:

1. C. Siva Ram Murthy & B. S. Manoj; Ad-hoc Wireless Networks; 2nd Edition, Pearson Education,
2. Ozan K. Tonguz and Gianguigi Ferrari; Ad-hoc Wireless Networks; John Wiley, 2007.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: Bachelor of Technology

Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBEC-7103	Embedded System Design	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz- Max. Marks: Nil	

Pre-Requisite	Nil.
Course Objective	To become familiar of embedded systems and its design.
Course Outcome	Student will be able to learn: 1. Introduction to embedded systems. 2. Typical embedded system. 3. Embedded firmware. 4. Operating system basics 5. Task communication and task synchronization.

Unit	Contents (Theory)	Marks Weightage
I	Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.	14
II	Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.	14
III	Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.	14
IV	RTOS Based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.	14
V	Task Communication: Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, Methods to Choose an RTOS.	14

Text Book/References Books/ Websites:

1. Shibu K.V; Introduction to Embedded Systems; Mc Graw Hill.
2. Raj Kamal; Embedded Systems; TMH.
3. Frank Vahid, Tony Givargis; Embedded System Design; John Wiley.

Suggested List of Laboratory Practical (Expandable): Nil

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Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-7104	Biomedical Instrumentation	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	To make students familiar with basic concepts and tool used in neural network.
Course Outcomes	Student will be able to learn: 1. To understand the philosophy of the heart, lung, blood circulation . 2. Non electrical parameters measurement and diagnostic procedures:. 3. Electrical parameters acquisition and analysis. 4. Imaging modalities and analysis. 5. Life assisting, therapeutic and robotic devices.

Unit	Contents (Theory)	Marks Weightage
I	Introduction: Cell and its structure – Resting and Action Potential – Nervous system and its fundamentals - Basic components of a biomedical system- Cardiovascular systems- Respiratory systems -Kidney and blood flow - Biomechanics of bone - Biomechanics of soft tissues - Physiological signals and transducers - Transducers – selection criteria – Piezo electric, ultrasonic transducers - Temperature measurements - Fibre optic temperature sensors.	14
II	Non Electrical Parameters Measurement And Diagnostic Procedures: Measurement of blood pressure - Cardiac output - Heart rate - Heart sound - Pulmonary function measurements – spirometer – Photo Plethysmography, Body Plethysmography – Blood Gas analysers, pH of blood –measurement of blood pCO ₂ , pO ₂ , finger-tip oxymeter - ESR, GSR measurements.	14
III	Electrical Parameters Acquisition And Analysis: Electrodes – Limb electrodes –floating electrodes – pregelled disposability electrodes - Micro, needle and surface electrodes – Amplifiers, Preamplifiers, differential amplifiers, chopper amplifiers – Isolation amplifier - ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms - Electrical safety in medical environment, shock hazards – leakage current-Instruments for checking safety parameters of biomedical equipment.	14
IV	Imaging Modalities And Analysis: Radio graphic and fluoroscopic techniques – Computer tomography – MRI – Ultrasonography – Endoscopy – Thermography –Different types of biotelemetry systems - Retinal Imaging - Imaging application in Biometric systems.	14
V	Life Assisting, Therapeutic And Robotic Devices: Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy – Heart – Lung machine – Audio meters – Dialysers – Lithotripsy - ICCU patient monitoring system - Nano Robots - Robotic surgery –Orthopedic prostheses fixation.	14

Text Book/References Books/ Websites:

1. Leslie Cromwell; Biomedical Instrumentation and Measurement; Prentice Hall of India, New Delhi.
2. Khandpur R.S; Handbook of Biomedical Instrumentation; Tata McGraw-Hill, New Delhi, 2nd edition.
3. Joseph J Carr and John M. Brown; Introduction to Biomedical Equipment Technology; John Wiley and sons, New York, 4th edition.

Suggested List of Laboratory Practical (Expandable): Nil

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Subject Code	Subject Title	Credit			Theory			Practical		
CBTE-7201	Advanced Data Networks	L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total (Nil)
		3	-	-			Min: 40 (D Grade)			

Duration of Theory (Externals): 3 Hours

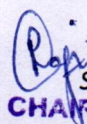
Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	To make students familiar with basic concepts Data communication.
Course Outcomes	Student will be able to learn: 1. Wireless network operation. 2. Mobile Data Networks 3. IEEE 802.11 WLANs. 4. Wireless Personal Area Network. 5. Optical Networks.

Unit	Contents (Theory)	Marks Weightage
I	Wireless network operation: Network Planning, Introduction, wireless network topologies, cellular topology. Introduction, mobility management, radio resources and power management, security in wireless networks.	14
II	Mobile Data Networks: Introduction, the data-oriented CDPD network, GPRS and higher data rates, short messaging services in GSM, mobile application protocols. Introduction, historical overview of the LAN industry, evolution of the WLAN industry, new interest from military and service providers, a new explosion of market and technology, wireless home networking.	14
III	IEEE 802.11 WLANs: Introduction, what is IEEE 802.11? The PHY layer, MAC sublayer, MAC management sublayer. HIPERLAN What is HIPERLAN? HIPERLAN-2 Wireless Geolocation Systems Introduction, what is Wireless Geolocation? Wireless geolocation system architecture, technologies for wireless geolocation, geolocation standards for E-911 services, performance measures for geolocation systems.	14
IV	Wireless Personal Area Network (WPAN): Introduction, what is IEEE 802.15 WPAN? What is HomeRF? What is Bluetooth? Interference between Bluetooth and 802.11. Satellite navigation and global positioning system: Introduction, radio and satellite navigation, GPS position location principles, GPS time, GPS receivers and codes, the C/A code, Satellite signal acquisition, GPS signal levels, timing accuracy, GPS receiver operation, GPS C/A code accuracy, differential GPS.	14
V	Optical Networks: Network Concepts, terminology, categories, layers. Network topologies: performance of passive linear buses, performance of star architectures. SONET/SDH : transmission formats and speeds, optical interfaces, SONET/SDH rings, SONET/SDH networks. High speed light-wave links: links operating at 10, 40 and 160 Gbps.	14

Text Book/References Books/ Websites:

1. K. Pahlavan and P. Krishnamurthy: Principles of Wireless Networks, PHI Learning..
2. G. Keiser: Optical Fiber Communications, 4th Edition, TMH New Delhi.
3. Upena Dalal: Wireless Communications, Oxford University Press.

Suggested List of Laboratory Practical (Expandable): Nil


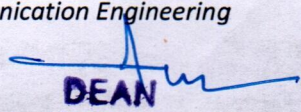
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PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: Bachelor of Technology

Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-7202	IoT System Architecture	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Attendance /Quiz - Max. Marks: Nil	

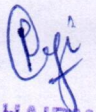
Pre-Requisite	Nil
Course Objective	To make students familiar with basic concepts and tool used in internet of things.
Course Outcomes	Student will be able to learn: 1. To describe the programmer's model.. 2. design principles for connected devices: 3. Web communication protocols. 4. Data acquiring and storage. 5. Sensor technology.

Unit	Contents (Theory)	Marks Weightage
I	Internet of Things: An Overview, Internet of Things, IoT conceptual framework, IoT architectural view, Technology behind IoT, Sources of IoT, M2M communication, Examples of IoT.	14
II	Design Principles for Connected Devices: Introduction, IoT/M2M systems layers and designs standardization, Communication technologies, Data enrichment, Data consolidation and device management at gateway, Ease of Designing and Affordability.	14
III	Web Communication Protocols: for connected devices, Message communication protocols for connected devices, web connectivity for connected-devices network using gateway, Internet connectivity principles, IP addressing in IoT, Proxy authentication, Media Access control, Application Layer Protocols.	14
IV	Data Acquiring And Storage: Organizing the data, Analytics, Knowledge acquiring, managing and storing processes, cloud computing paradigm for data collection storage and computing, IoT cloud based services.	14
V	Sensor Technology : Analog sensors and Digital sensors, Actuator, Sensor data communication protocols, Radio frequency identification technology, wireless sensor networks, Introduction to Arduino, Arduino IDE, Node MCU, Introduction to Raspberry Pi. IoT case study: Smart city street lights control and monitoring.	14

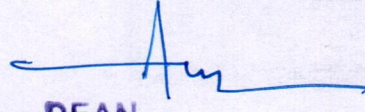
Text Book/References Books/ Websites:

1. Raj kamal;Internet of Things architecture and design principles;led, Mc Graw Hill..
2. Peter Waher;Learning Internet of Things; PACKT publishing BIRMINGHAM – MUMBAI,.

Suggested List of Laboratory Practical (Expandable): Nil


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School of Research and Technology

Department: Electronics & Communication Engineering

PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*

Programme: Bachelor of Technology

Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-7203	Microelectronics Chip Fabrication	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Attendance /Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	To make students familiar with basic concepts semiconductor devices.
Course Outcomes	Student will be able to learn: 1. Overview of IC fabrication. 2. Impurity Incorporation 3. Lithography. 4. Epitaxial growth of silicon. 5. Plasma and Rapid Thermal Processing.

Unit	Contents (Theory)	Marks Weightage
I	Overview of IC fabrication: History of semiconductor devices: diodes, transistors, Germanium/Silicon transition, monolithic integrated circuits, Basic fabrication steps and their Importance. Environment of IC Technology: Concepts of Clean room and safety requirements, Concepts of Wafer cleaning processes and wet chemical etching techniques.	14
II	Impurity Incorporation: Solid State diffusion modeling and technology; Ion Implantation modeling, technology and damage annealing, characterization of Impurity profiles Oxidation: Kinetics of Silicon dioxide growth both for thick, thin and ultra thin films, Oxidation technologies in VLSI and ULSI, Characterization of oxide films, High k and low k dielectrics for ULSI.	14
III	Lithography: Photolithography, E-beam lithography and newer lithography techniques for VLSI/ULSI, Mask generation. Chemical Vapour Deposition Techniques: CVD techniques for deposition of polysilicon, silicon dioxide, silicon nitride and metal films	14
IV	Epitaxial growth of silicon: modeling and technology. Metal Film Deposition: Evaporation and sputtering techniques, Failure mechanisms in metal interconnects Multi-level metallization schemes.	14
V	Plasma and Rapid Thermal Processing: PECVD, Plasma etching and RIE techniques; RTP techniques for annealing, growth and deposition of various films for use in ULSI.	14

Text Book/References Books/ Websites:

- 1.S.M.Sze(2nd Edition)"VLSI Technology", McGraw Hill Companies Inc..
- 2.C.Y. Chang and S.M.Sze (Ed), "ULSI Technology", McGraw Hill Companies Inc.

Suggested List of Laboratory Practical (Expandable): Nil

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Programme: Bachelor of Technology

Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (70)	Internal (30)	Total (100) Min: 40 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-7204	Nanoelectronics	3	-	-						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/ Attendance /Quiz' - Max. Marks: Nil	

Pre-Requisite	Basic knowledge of semiconductor physics.
Course Objective	To give the knowledge of build and understand the relations between Nanoelectronic systems, devices and quantum phenomena.
Course Outcomes	Student will be able to learn: 1. An information for nanoelectronic systems and devices. 2. Type of systems and quantum mechanical concepts.. 3. The knowledge of fabrication technology of nanoelectronics. 4. Non-lithographic techniques. 5. Lithographic process.

Unit	Contents (Theory)	Marks Weightage
I	Introduction: The 'Top down' and 'Bottom up' approach, Why Nan electronics?. Nanotechnology potential. Band structure and density of states at Nanoscale: energy bands, density of states at low dimensional structure. Electrical Transport in Nanostructure: Electrical conduction in metals, insulator/ionic crystals and semiconductors. Conduction mechanism in bulk, thin film and low dimensional system. Introductory quantum mechanics for Nanoscience: size effect in smaller systems, quantum behavior of nanometric world.	14
II	Tunnel Junction and Application of Tunneling: Tunneling through a potential barrier, potential energy profiles of material interfaces, applications of tunneling. Quantum wells, wires and dots: Semiconductor hetrostructure and quantum wells, quantum dots and nanoparticles.	14
III	Single Electron Transistor: Coulomb Blockade, single electron transistor, other SET and FET structures.	14
IV	Ballistic and Spin Transport: Classical and semi-classical transport, ballistic transport, carbon nano tubes and nano wires, transport of spin and spintronics. The Era of New Nanostructures of Carbon: Buck minsterfullerence, Nano diomond, BN Nano tubes, Molecular Machine, Nanobiometrics.	14
V	Fabrication Technology: Top-down vs bottom-up technology. Lithographic process: Lithography, Nanolithography, split gate technology, self assembly, limitation of lithographic process. Non-lithographic Techniques: Plasma arc discharge, sputtering, evaporation, chemical vapour deposition, pulsed laser deposition, molecular beam epitaxy, sol-gel technique, electrodeposition and other process.	14

Text Book/References Books/ Websites:-

1. G. W. Hanson; Fundamentals of Nanoelectronics; Pearson Education.
2. K. Chattopadhyay & A. N. Banerjee; Introduction to Nanoscience and Nanotechnology; PHI
3. Vlaadiniz U. Mitin; Introduction to Nanoelectronics; Cambridge University Press.

Suggested List of Laboratory Experiments :- (Expandable): Nil

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Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total	End Sem	Internal	Total
CBEC-703	CMOS VLSI Design						(100)			
		3	-	-	(70)	(30)	Min: 40 (D Grade)	(Nil)	(Nil)	(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance /Quiz- Max. Marks: Nil	

Pre-Requisite	To have knowledge of digital electronics.
Course Objective	Basic CMOS Circuits, CMOS process technology, concepts of designing VLSI Subsystems.
Course Outcome	Student will be able to learn: 1. To understand transistor principle. 2. The combinational logic circuits 3. To get to know about sequential logic circuits. 4. The principle of designing arithmetic building blocks. 5. The implementation strategies.

Unit	Contents (Theory)	Marks Weightage
I	Transistor Principle: NMOS and PMOS transistors, Process parameters for MOS and CMOS, Electrical properties of CMOS circuits and device modeling, Scaling principles and fundamental limits, CMOS inverter scaling, propagation delays, Stick diagram, Layout diagrams	14
II	Combinational Logic Circuits: Examples of Combinational Logic Design, Elmore's constant, Pass transistor Logic, Transmission gates, static and dynamic CMOS design, Power dissipation – Low power design principles	14
III	Sequential Logic Circuits: Static and Dynamic Latches and Registers, Timing issues, pipelines, clock strategies, Memory architecture and memory control circuits, Low power memory circuits, Synchronous and Asynchronous design.	14
IV	Designing Arithmetic Building Blocks: Data path circuits, Architectures for ripple carry adders, carry look ahead adders, High speed adders, accumulators, Multipliers, dividers, Barrel shifters, speed and area tradeoff	14
V	Implementation Strategies: Full custom and Semi custom design, Standard cell design and cell libraries, FPGA building block architectures, FPGA interconnect routing procedures.	14

Text Book/References Books/ Websites:-

1. N.Weste, K.Eshraghian; Principles of CMOS VLSI Design; Second Edition, Addison Wesley.
2. R.Jacob Baker, Harry W.Li., David E.Boyee; CMOS Circuit Design, Layout and Simulation; Prentice Hall of India 2005
3. A.Pucknell, Kamran Eshraghian; BASIC VLSI Design; Third Edition, Prentice Hall of India, 2007.

Suggested List of Laboratory Experiments :- (Expandable): Nil

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Programme: Bachelor of Technology

Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100) Min: 40 (D Grade)	External (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBEC-704	Antenna & Wave Propagation	3	-	1						

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/Attendance /Quiz- Max. Marks: 15	

Pre-Requisite	Basic knowledge of electromagnetic theory.
Course Objective	To understand the antenna arrays and analysis methods and design techniques
Course Outcome	Student will be able to learn: 1. To understand basic concept in antenna. 2. To know about antenna arrays and patterns. 3. To understand types of antennas & designing. 4. To understand different methods for array synthesis. 5. To understand propagation of radio wave:

Unit	Contents (Theory)	Marks Weightage
I	Introduction to Antenna: Antenna terminology, radiation, retarded potential, radiation field from current element, radiation resistance of short dipole and half wave dipole antenna, network theorems applied to antenna, self and mutual impedance of antenna, effect of earth on vertical pattern and image antenna.	14
II	Antenna Arrays: Antenna array of point sources, two element array, end fire and broad side arrays, uniform linear arrays of n-elements, linear arrays with non-uniform amplitude distribution (binomial distribution and Chebyshev optimum distribution), arrays of two-driven half wave length elements (broad side and end fire case), principle of pattern multiplication.	14
III	Types of Antennas & Designing: Babinet's principles and complementary antenna, horn antenna, parabolic reflector antenna, slot antenna, log periodic antenna, loop antenna, helical antenna, biconical antenna, folded dipole antenna, Yagi-Uda antenna, VHF & UHF antennas, lens antenna, turnstile antenna. Long wire antenna: resonant and travelling wave antennas for different wave lengths, V-antenna, rhombic antenna, beverage antenna, microstrip antenna.	14
IV	Antenna Array Synthesis: Introduction, continuous sources, methods-Schelkoff polynomial method, Fourier transform method, Woodward- Lawson method, Taylor's method, Laplace transform method, Dolph- Chebychev method, triangular, cosine and cosine squared amplitude distribution, line source, phase distribution, continuous aperture sources.	14
V	Propagation of Radio Wave: Structure of troposphere, stratosphere and ionosphere, modes of propagation, ground wave propagation, duct propagation. Sky wave propagation: Mechanism of Radio Wave Bending by Ionosphere, critical angle and critical frequency, virtual height, skip distance and LUF, MUF. Single hop and multiple hop transmission, influence of earth's magnetic field on radio wave propagation, Fading Space Wave Propagation: LOS, effective earth's radius, field strength of space or tropospheric propagation.	14

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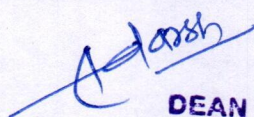
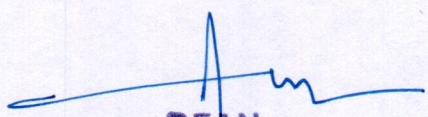
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PEOPLE'S UNIVERSITY, BHOPAL***(Applicable for Admitted from Academic Session 2019-20 onwards)*****Programme: Bachelor of Technology****Semester –VII****Text Book/References Books/ Websites:-**

1. John D Kraus; Antennas for all Applications; 3rd Edition, Mc Graw Hill, 2005.
2. Robert S.Elliott; Antenna Theory and Design; Wiley Student Edition, 2006.
3. K. D. Prasad; Antennas and Wave Propagation; Satya Prakashan.

Suggested List of Laboratory Experiments :- (Expandable):

1. To Plot the radiation pattern of a simple dipole $\lambda/2$ antenna.
2. To Plot the radiation pattern of a rhombus antenna.
3. To Plot the radiation pattern of a parabolic reflector antenna.
4. To Plot the radiation pattern of a log periodic antenna.
5. To Plot the radiation pattern of a ground plane antenna.
6. To Plot the radiation pattern of a folded dipole antenna.
7. To Plot the radiation pattern of a yagi antenna.
8. To Plot the radiation pattern of a collinear antenna.
9. To Plot the radiation pattern of a broad side antenna.
10. To Plot the radiation pattern of a square roof antenna.


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PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*

Programme: Bachelor of Technology

Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
CBEC-705	Optical Communication	L	T	P	External (70)	Internal (30)	Total (100)	External (35)	Internal (15)	Total (50)
		3	1	1			Min: 40 (D Grade)			Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance – Max. Marks: 10
Practical Internal Max Marks: 15	Lab Performance/Attendance /Quiz- Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	To expose the students to the basics of signal propagation through optical fibers, fiber impairments, components and devices and system design.
Course Outcome	Student will be able to learn: 1. The Generation and motivation of the Optical technologies. 2. To understand optical Sources. 3. To understand Signal Degradation in Optical Fibers. 4. The Fundamental receiver operation. 5. The Wavelength Division Multiplexing (WDM) Concepts.

Unit	Contents (Theory)	Marks Weightage
I	Optical Fibers: Generation and motivation of the Optical technologies, optical spectral bands, key elements of optical fiber systems, basic optical laws and definitions, optical fiber modes and configurations, mode theory for circular waveguides, single mode fibers, graded-index fiber structure, fiber materials, photonic crystal fibers, fiber fabrication, fiber optic cables.	14
II	Optical Sources: Structures, materials, quantum efficiency of Light emitting diodes, LED power, modulation of an LED. Laser diodes: modes, threshold conditions, laser diode rate equations, external quantum efficiency, resonant frequencies, structure and radiation patterns, single mode lasers, modulation of laser diodes. 3dB frequency concept. Power Launching and Coupling: Source to fiber power launching, fiber to fiber joints, LED coupling to single mode fibers, fiber splicing, and optical fiber connectors.	14
III	Photo Detectors: PIN, Photo detector, avalanche photodiodes, photo detector noise, detector response time, avalanche multiplication noise, Signal Degradation in Optical Fibers: Attenuation: units, absorption, scattering losses, bending losses, core and cladding losses. Signal distortion in fibers: overview of distortion origins, modal delay, factors contributing to delay, group delay, material dispersion, waveguide dispersion, polarization-mode dispersion. Characteristics of single mode fibers: refractive index profiles, cutoff wavelength, dispersion calculations, mode field diameter, bending loss calculation. Specialty fibers.	14
IV	Optical Receivers: Fundamental receiver operation, digital receiver performance, eye diagrams, coherent detection: homodyne and heterodyne, burst mode receiver, analog receivers. Digital links: Point to point links, link power budget, rise time budget, power penalties. Analog links: Overview of analog links, carrier to noise ratio, multichannel transmission techniques.	14
V	Wavelength Division Multiplexing (WDM) Concepts: Operational principles of WDM, passive optical star coupler, isolators, circulators, and active optical components: MEMS technology, variable optical attenuators, tunable optical filters, dynamic gain equalizers, polarization controller, chromatic dispersion compensators. Optical Amplifiers: Basic applications and types of optical amplifiers, Erbium Doped Fiber Amplifiers (EDFA): amplification mechanism, architecture, power conversion efficiency and gain. Amplifier noise, optical SNR, system applications. Performance Measurement and Monitoring: Measurement standards, basic test equipment, optical power measurements, optical fiber characterization, eye	14

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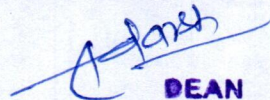
diagram tests, optical time-domain reflectometer, optical performance monitoring.	
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Text Book/References Books/ Websites:

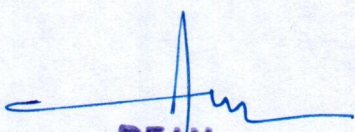
1. Keiser; Optical Fiber Communications; 4th Edition, TMH New Delhi.
2. J. M. Senior; Optical Fiber Communication-Principles and Practices; 2nd Edition, Pearson Edu.
3. G. P. Agarwal; Fiber Optic Communication Systems; 3rd Edition, Wiley India Pvt. Ltd.

Suggested List of Laboratory Experiments :- (Expandable):

1. To study a 650 nm fiber optical analog links. Also study the relationship between input and output signal
2. To study a 650 nm fiber optical digital links. Also study the relationship between input and output signal
3. To the study of intensity modulation technique using analog input signal.
4. To the study of intensity modulation technique using digital input signal.
5. To study frequency modulation.
6. To study pulse width modulation.
7. To measure propagation attenuation loss in optical fiber.
8. To study bending loss.
9. To determine the numerical aperture of optical fiber.
10. To study the effect of optical receiver characteristics on a system performance.


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PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*

Programme: Bachelor of Technology

Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
CBEC-706	Satellite Communication	L	T	P	End Sem (70)	Internal (30)	Total (100)	End Sem (Nil)	Internal (Nil)	Total (Nil)
		3	1	-			Min: 40 (D Grade)			

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 20	Assignment/Quiz/Attendance - Max. Marks: 10
Practical Internal Max Marks: Nil	Lab Performance/Attendance / Quiz - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	To give the knowledge of broad treatment of the diverse subsystems that makes up a complete satellite communication system.
Course Outcomes	Student will be able to learn: 1. To know overview of Satellite Systems. 2. The Geostationary Orbit: 3. The Space Segment. 4. The Space Link & Link Design. 5. To understand satellite Services.

Unit	Contents (Theory)	Marks Weightage
I	Overview of Satellite Systems: Introduction, History of Satellites operations, Frequency allocations for satellite systems. Orbits and launching methods: Kepler's three laws of planetary motion, terms used for earth orbiting satellites, orbital elements, apogee and perigee heights, orbit perturbations, inclined orbits, local mean solar point and sun-synchronous orbits, standard time.	14
II	The Geostationary Orbit: Introduction, antenna look angles, polar mount antenna, limits of visibility, near geostationary orbits, earth eclipse of satellite, sun transit outage, launching orbits. Polarization: Antenna polarization, polarization of satellite signals, cross polarization discrimination. Depolarization: Ionospheric, rain, ice.	14
III	The Space Segment: Introduction, power supply, attitude control, station keeping, thermal control, TT&C subsystem, transponders, antenna subsystem, Morelos and Satmex 5, Anik-satellites, Advanced Tiros-N spacecraft. The Earth segment: Introduction, receive-only home TV systems, master antenna TV system, Community antenna TV system, transmit-receive earth station.	14
IV	The Space Link & Link Design: Introduction, Equivalent isotropic radiated power (EIPR), transmission losses, the link power budget equation, system noise, carrier-to-noise ratio (C/N), the uplink, the downlink, effects of rain, combined uplink and downlink C/N ratio, inter modulation noise, inter-satellite links. Interference between satellite circuits.	14
V	Satellite Services: VSAT (Very Small Aperture Terminal) Systems: overview, network architecture, access control protocols, basic techniques, VSAT earth station, calculation of link margins for a VSAT star network. Direct Broadcast satellite (DBS) Television and Radio: digital DBS TV, BDS TV system design and link budget, error control in digital DBS-TV, installation of DBS-TV antennas, satellite radio broadcasting.	14

Text Book/References Books/ Websites:

1. D. Roddy; Satellite Communications; 4th Edition, TMH, New Delhi.
2. T. Pratt, C. Bostian and J. Allnut; Satellite Communications; 2nd Edition, Wiley India Pvt. Ltd.
3. D.C. Agarwal; Satellite Communications; Khanna Publishers.

Suggested List of Laboratory Experiments :- (Expandable): Nil

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Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
CBEC-707	Innovative Project Lab	L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (Nil)	Internal (50)	Total (50) Min: 20 (D Grade)
		-	-	1						

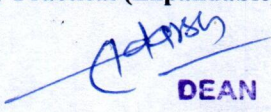
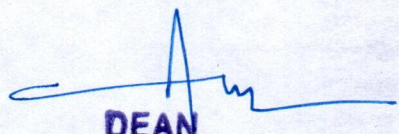
Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance – Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

Pre-Requisite	Fundamental Engineering concepts of concern discipline.
Course Objective	This course sets in motion an exploration of the fundamental approaches that underpin the making and development of an innovation. It draws on ideas and practices such as - interdisciplinary, creativity, collaboration and entrepreneurship to identify problems and opportunities that give rise to innovation.
Course Outcomes	Student will be able to learn: 1. Carry out independent and/or collaborative research in the planning and scoping of a creative industry project that seeks to present an innovative outcome. 2. Identify, analyze & define the problem. 3. Generate alternative solutions to the problem identified. 4. Compare & select feasible solutions from alternatives generated. 5. To work effectively in a team.

Unit	Contents (Theory)	Marks Weightage
I	Students shall be encouraged to form groups (Maximum 5) to do a Project on technical topic of concern branch. The student should prepare a working system or some design or understanding of a complex system (on minor level) that he/she has selected for his/her innovative project work using system analysis tools and submit the same in the form of a write-up i.e. detail project report. The student should maintain proper documentation of different stages of project such as concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan wherever applicable. Each student is required to prepare a project report based on the above points and present the same at the final examination with a demonstration of their project.	50

Text Book/References Books/ Websites: Nil**Suggested List of Laboratory Practical (Expandable): Nil**

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Programme: Bachelor of Technology

Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (Nil)	Internal (50)	Total (50) Min: 20 (D Grade)
CBTE-708	Introduction to MATLAB	-	-	1						

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

Pre-Requisite	C Programming, Basics of Engineering Mathematics, Basic computer literacy is expected.
Course Objective	1. To Impart the Knowledge to the students with MATLAB software to enhances programming knowledge in Research and Development. 2. To introduce students the use of a high-level programming language, MATLAB for scientific problem solving with engineering applications.
Course Outcomes	Student will be able to learn: 1. Understand the basics of MATLAB. 2. Break a complex task up into smaller, simpler tasks. 3. To prepare programmes under Case Study (Any two Modules). 4. Tabulate results and analyze.

Unit	Contents (Theory)	Marks Weightage
I	1. Introduction- Starting MATLAB, Using MATLAB as a calculator, Creating MATLAB variables, Making corrections, Miscellaneous commands 2. Mathematical functions- Creating simple plots, Adding titles, axis labels, and annotations, multiple data sets in one plot, Matrix generation, entering a vector, Matrix indexing. 3. Array operations and Linear equations- Array arithmetic operations, Matrix inverse, Matrix functions. 4. Introduction to programming in MATLAB - M-File Scripts, Script side-effects, Anatomy of a M-File function, Input and output arguments, Input to a script file, Output commands. 5. Debugging M-files - Debugging process , Preparing for debugging, Setting breakpoints, Running with breakpoints.	50

Text Book/References Books/ Websites:

1. <http://www.matlabtutorials.com/mathforum/>
2. <http://www.mathworks.in/matlabcentral/>
3. MATLAB Manuals and Handbooks

Suggested List of Laboratory Practical (Expandable):

1. Study of introduction to MATLAB.
2. Find the factorial of 5 using MATLAB command.
3. Generate the following row vector $b=[1, 2, 3, 4, 5, \dots, 9, 10]$, then transpose it to column vector.
4. Write a programme to Solve the following system $x+y=1$ $x-y+z=0$ $x+y+z=2$
5. Write a programme, let $x=[2 -3 5; 0 11 0]$, then a) find elements in x that are greater than 2 b) find the number of nonzero elements in x.
6. Plot Sinc function, where $\text{Sinc}(x) = \sin(x) / x$, and $-2\pi \leq x \leq 2\pi$
7. Study of M file, Script file and function file in MATLAB with suitable examples.
8. Two case studies related to your respective disciplines.

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PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*

Programme: Bachelor of Technology

Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (50)	Total (50) Min: 20 (D Grade)	End Sem (Nil)	Internal (Nil)	Total (Nil)
CBTE-709	Psychology	1	-	-						

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: 50	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: 50
Practical Internal Max Marks: Nil	Lab Performance/ Quiz/Attendance - Max. Marks: Nil	

Pre-Requisite	Nil
Course Objective	This course makes the students able to understand and deal with personal and professional aspects of life. They become able to deal with common psychological problems encountered in an engineer's life. Their ability to deal with societal aspects of behavior is enhanced. By application of knowledge their quality of personal living and job is maximized.
Course Outcomes	Student will be able to learn: 1. Be able to understand and deal with personal and organization phenomenon. 2. Be able to deal with common psychological aspects related to an Engineer's life. 3. Be able to understand the impact of social environment on individuals, groups and communities. 4. Be able to utilize the knowledge of Sociology and to improve the quality of living of self and social relationship at large.

Unit	Contents (Theory)	Marks Weightage
I	Psychology: Introduction Definition and Scope of Psychology; Psychology as a science, Personality: Definition, types of personality, Measurement of Personality. Perception, Motivation and Learning.	10
II	Application of Psychology: Stress-management, Well-being; Self-development: Application of Psychology in building memory and creativity.	10
III	Sociology: Introduction, Importance of Sociology for Engineers, Sociology: Definition and nature; Origin of Society, Social Processes: – Competition, Cooperation Conflict, Accommodation and Assimilation, Social groups – Types and Characteristics; Social Institutions: Marriage: and Family; Religion: Functions and dysfunctions of religion.	10
IV	Social concerns Social Stratification: Nature and types, Prejudices, Social Mobility. Social Changes: – Urbanization, Westernization, and Pluralism. Social Disorganization, Social Problems: – Deviance, Delinquent behavior amongst youth, Crime, Prostitution, Gender injustice, Child Abuse, Terrorism. Social Movements.	10
V	Cognitive Psychology. An introduction to human mental processes, problem solving, pattern recognition, imagery, memory retention, language comprehension Attention & Perception: Definition, types of attention, perception.	10

Text Book/References Books/ Websites:

1. Eastwood and Atwater; Psychology for living: Adjustment, growth and behavior today; Prentice Hall.
2. Meena Hariharan and Radhanath Rath, Coping with life stress. Sage Publications, ;
3. Shankar Rao; C.N, Sociology; S.Chand & Co Ltd.
4. S. K. Mangal; General Psychology; Sterling Publishers Pvt. Ltd.
5. Baron A. Robert; Psychology; Prentice Hall of India.

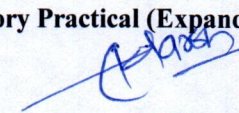
Suggested List of Laboratory Practical (Expandable): Nil


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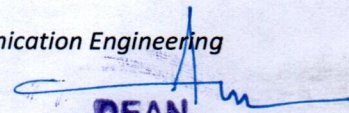


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Syllabus

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: Bachelor of Technology

Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
CBTE-710	Massive Open Online Courses (MOOCs)-II	L	T	P	End Sem (Nil)	Internal (Nil)	Total	End Sem (Nil)	Internal (50)	Total (50)
		-	-	1			(Nil)			Min: 20 (D Grade)

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/ Quiz/Attendance - Max. Marks: 50	

Pre-Requisite	Nil
Course Objective	MOOCs build on the engagement of learners who self-organize their participation according to learning goals, prior knowledge and skills, and common interests. Objective of this course is to improve the technical skills of students and its gives an opportunity to explore themselves beyond class room teaching.
Course Outcomes	Student will be able to learn: New interesting courses of their own curiosity and improve their knowledge and skills. MOOCs give an opportunity to connect openly on a global scale, with global learners. The ability to experiment with pedagogical methods on a vast scale.

Unit	Contents (Theory)	Marks Weightage
I	Massive Open Online Courses (MOOCs) are online courses that allow participants free access and unrestricted participation in any course of their choice. Besides the conventional modes of teaching such as lectures, videos and reading material, MOOCs also provide a platform for interactive forums. After the VI semester End Sem Examination, all students are instructed to register themselves in a minimum IV (Four weeks) MOOC/NPTEL/SWAYAM Certification course in their Engineering discipline. Students must appear in the certification examination conducted by NPTEL/ SWAYAM and submit it to their respective assigned faculty before the end of the semester. A student should give an effective PowerPoint presentation of chosen course in the class scientific seminars and receive feedback from each other. This effort will help them to communicate their ideas more clearly. The final evaluation of this course will base on a PowerPoint Presentation and Certification during the academic session by the assigned faculty.	50

Text Book/References Books/ Websites:

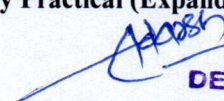
- <https://swayam.gov.in/>
- <http://nptel.ac.in>
- <https://onlinecourses-archive.nptel.ac.in>

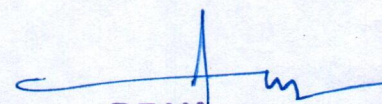
Suggested List of Laboratory Practical (Expandable): Nil


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Department: Electronics & Communication Engineering

PEOPLE'S UNIVERSITY, BHOPAL*(Applicable for Admitted from Academic Session 2019-20 onwards)*

Programme: Bachelor of Technology

Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (35)	Internal (15)	Total (50) Min: 20 (D Grade)
CBTE-711	Professional Ethics and Proficiency	-	-	1						

Duration of Theory (Externals): -Nil

Theory Internal- Max Marks: -Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: Nil
Practical Internal Max Marks: 15	Lab performance/Quiz/Attendance: Max. Marks: 15	

Pre-Requisite	Nil
Course Objective	To enable the students to imbibe and internalize the values and ethical behaviour in personal and professional live.
Course Outcome	Student will be able to: 1. Understand the core values that shape the ethical behaviour of a professional. 2. Learn the need for professional ethics, codes of ethics and roles. 3. Discuss the ethical issues related to engineering. 4. Realize the responsibilities and rights of an engineer in the society. 5. Apply the knowledge of human values and social values to contemporary ethical values and global issues.

Unit	Contents (Theory)	Marks Weightage
I	Introduction to Professional ethics. Basic concepts, Governing ethics , Personal and Professional ethics, Ethical Dilemmas, Life Skills, Emotional intelligence, Thoughts of Ethics, Value education, Dimension of ethics, Professional associations, Professional risks, Professional accountabilities, Professional success, Ethics and profession .	50
II	Communications: Communication and personality development covering, Psychological aspects of communication, cognition as a part of communication;; Politeness and Etiquette in communication; Cultural factors that influence communication; Mannerisms to be avoided in communication; Language and persuasion; Language and conflict resolution.	
III	Career Oriental Communication covering, Resume and Bio-data: Design & style; Applying for a job: Language and format of job application. Job Interviews: purpose and process.	
IV	Presentation Skills: Power-point presentation: structure and format; Using e-mail for business communication; Standard e-mail practices; Language in e-mail; Using internet for collecting information; Referencing while using internet materials for project reports. Advanced Techniques in Technical Communication covering, Interview through telephone/video-conferencing;	
V	Global Ethical Issues. Multinational Corporations- Environmental Ethics- Business Ethics- Computer Ethics -Role in Technological Development-Engineers as Managers- Consulting Engineers- Engineers as Expert witnesses and advisor -Moral leadership.	

Text Book/References Books/ Websites:

1. M. Govindarajan, S .Natarajan and V. S. Senthil Kumar, Engineering Ethics, PHI Learning Private Ltd, New Delhi, 2012.
2. R S Naagarazan, A text book on professional ethics and human values, New age international (P) limited, New Delhi, 2006.
3. Mike W Martin and Roland Schinzinger, Ethics in Engineering, 4th edition, Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi, 2014.

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Programme: **Bachelor of Technology**

Semester –VII

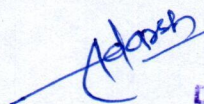
4. Charles D Fleddermann, Engineering Ethics, Pearson Education/ Prentice Hall of India, New Jersey, 2004.
5. <http://www.slideword.org/slidestag.aspx/human-values-and-Professional-ethics>.

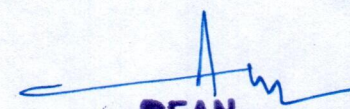
Suggested List of Laboratory Practical (Expandable): Nil

Students should prepare and submit hard and soft copy of their report to assigned faculty before End Semester Examination.


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Syllabus

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: Bachelor of Technology

Semester –VII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem	Internal	Total	End Sem	Internal	Total
CBTE-712	GD/Seminar	-	-	1	(Nil)	(Nil)	(Nil)	(Nil)	(50)	(50)
										Min: 20 (D Grade)

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 50	Lab Performance/Attendance /Quiz - Max. Marks: 50	

Pre-Requisite	Nil
Course Objective	To enable the students perform as a team player and also emerge as a leader in the group.
Course Outcomes	Student will be able to: 1. Understand nature, importance and characteristics of group discussion. 2. Familiarise himself/herself with the different types of group discussions. 3. Learn to identify areas of evaluation in selection group discussions. 4. Chalk out strategies for making individual contributions in group discussion. 5. Learn the method of in-depth study in a specialized area and prepare and present the report of the same.

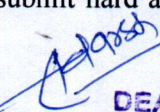
Unit	Contents (Theory)	Marks Weightage
I	Group Discussion: • Nature, importance and characteristics of group discussions. • Selection Group Discussions • Group Discussion Strategies • Techniques for Individual Contribution • Group Interaction Strategies	50
	Seminar: • In depth study in a specialized area by doing literature survey, understanding different aspects of the problem and arriving at a status report in that area. • Learn investigation methodologies, study relevant research papers, correlate work of various authors/researchers critically, study concepts, techniques, prevailing results etc., analyze it and present a seminar report.	

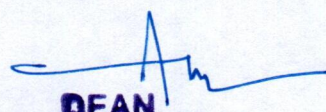
Text Book/References Books/ Websites: Nil

Suggested List of Laboratory Practical (Expandable):

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Programme: Bachelor of Technology

Semester –VIII

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	End Sem (Nil)	Internal (Nil)	Total (Nil)	End Sem (300)	Internal (200)	Total (500) Min: 200 (D Grade)
CBEC-801	Project Internship and Viva- Voce	-	-	10						

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil
Practical Internal Max Marks: 200	Lab Performance/Attendance /Quiz - Max. Marks: 200	

Pre-Requisite	Must have practical knowledge of respective program.
Course Objective	Will expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry. Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job. • Exposure to the current technological developments relevant to the subject area of training.
Course Outcomes	Student will be able to learn: 1. After completion of this semester long course the student trained in his specialized area of operation. 2. Will be able to critically think, observe and communicate. 3. Will acquire the work experience through advance learning (in terms of depth, complexity and engagement) in an industrial environment. 4. Will be able to apply, extend and test the knowledge gained from class room experience to understand and mitigate complex issues and address real industry challenges 5. Will be able to assimilate technical and administrative or managerial skills from his interactions with a variety of individuals, systems and practices

Unit	Contents (Theory)	Marks Weightage
I	The purpose of the Internship Program is to provide each student practical experience in a standard work environment. The students must undergo industrial training/internship for a minimum period of one semester during the 8th semester in any of the reputed industry, Government-sponsored Research & Development Organization, and reputed academic institution/foreign universities. The student will give a seminar with help of power point presentation based on his/her training report before an departmental expert committee constituted by the concerned department as per norms of the institute and submit a report in hard copy to the department. The evaluation will be based on the following criteria: • Internal departmental presentation to check knowledge & experience of Project Internship. • External Viva-Voce to evaluate Project Internship work done by student.	500

Text Book/References Books/ Websites: Nil**Suggested List of Laboratory Practical (Expandable): Nil**

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