"Education for knowledge, science and culture"

-Shikshanmaharshi Dr. Bapuji Salunkhe

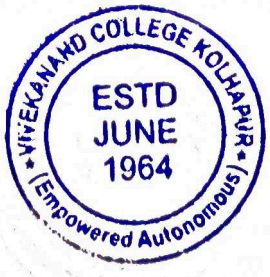
Shri Swami Vivekanand Shikshan Sanstha's

VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Department of Electronics

B. Sc. Part – III

CBCS Syllabus with effect from June, 2023



B.Sc.-III Electronics
Course Structure

Semester	Paper code	Title of Paper	Type of Paper	No. of Credits
Sem-V	DSE 1005E1	Fundamentals of Instrumentation	Elective	2
	DSE 1005E2	8051 Microcontroller Interfacing	Elective	2
	DSE 1005E3	Antenna and Wave Propagation	Elective	2
	DSE 1005E4	Industrial Process Control	Elective	2
	SEC 3	Computer Networks	Compulsory	2
Sem-VI	DSE 1005F1	Industrial Instrumentation	Elective	2
	DSE 1005F2	Advanced Microcontroller	Elective	2
	DSE 1005F3	Power Electronics	Elective	2
	DSE 1005F4	Internet of Things (IoT)	Elective	2
	SEC 4	Embedded System Design using Arduino	Compulsory	2

B. Sc. Part – III Electronics

Subject: Semester: V Paper- DSE 1005E1

Fundamentals of Instrumentation

Mark: 50 **Teaching Hours 36** **Credits 2**

Course Outcomes:

At the end of the course, a student will be able to:

CO1: understand the fundamentals of measurement and performance characteristics of instruments

CO2: apply fundamental knowledge of Instrument for electrical measurements

CO3: understand the principles, types, and selection criteria of transducers in various engineering applications.

CO4: understand the concepts, principles and types of actuators

Unit	Contents	Hours
1	**Fundamentals of Measurement** Introduction, Performance characteristics: Static and Dynamic characteristics of instruments, Error: Types of Errors (Gross error, systematic error, and random error), Impedance loading and matching, Calibrations: Definition and classification, Standards of measurement: Definition and types of Standard	(10)
2	**Basic Analog Measuring Instruments** DC galvanometer, PMMC and Moving Iron instruments, Voltmeter, Ammeter, RMS and True RMS concept, Extending range of ammeter, Design of multi-range ammeter, Extending range of voltmeter, Design of multi-range voltmeter, Series and shunt type ohmmeter, Single phase wattmeter: construction and working	(10)
3	**Transducers** Definition, Classification of Transducers, Selection criterion for Transducers, Detail Study of Transducers: Thermistor, RTD, Thermocouple, Semiconductor sensor(LM 35/AD590), Strain gauge, LVDT, Capacitive transducer (microphone), Opto-electric transducer – LDR, Photo diode, PIR, Ultrasonic sensor, Hall effect sensor, Loud speaker, Piezoelectric transducer, Proximity sensor- Inductive, capacitive	(08)
4	**Actuators** Definition, Principle, types and selection of Actuators, linear, rotary, logical and continuous Actuators Electrical actuating systems: Solid-state switches, Relays, Solenoids Electric Motors: Principle of operation Electro-mechanical: Servo, DC motor, Stepper motor	(08)

Reference Books:

1. Electronic Instruments, K.S. Kalsi, 2nd Edition, Tata Mc-Graw Hill, 2006
2. Transducers & Instrumentation, D V S Murty, 2nd Edition, PHI, 2011
3. Instrumentation Measurement and analysis, Nakra B C, Chaudry K, 3rd Edition, Tata McGraw Hill, 2012

B. Sc. Part – III Electronics
Subject: Semester: V Paper- DSE 1005E2
8051 Microcontroller Interfacing

Mark: 50 **Teaching Hours 36** **Credits 2**

Course Outcomes:

At the end of the course, a student will be able to:

CO1: program 8051microcontroller using Embedded C

CO2: interface and control various input and output devices using microcontrollers

CO3: understand and implement ADC and DAC interfacing techniques effectively

CO4: interface various sensors to 8051microcontroller

Unit	Contents	Hours
1	**Introduction to Embedded C** Advantages and disadvantages of programming in 8051-C & Assembly Language. Data types, Time delay – using *for* loop and using 8051 Timers, I/O programming, Logical operations, Data conversion programs	(8)
2	**Interfacing of Input Output Devices** Output devices: LED, Relay, Opto-coupler, LCD, Seven Segment Display, Seven Segment Display (multiplexing mode), DC Motor, Stepper Motor Input devices: Switch, 4X4 matrix keyboard, thumb wheel switch	(10)
3	**ADC, DAC Interfacing** Interface ADC 0804, ADC 0808/0809, ADC MAX1112, DAC 0808 (Triangular wave, Ramp, Staircase)	(8)
4	**Sensor Interfacing** Reed sensor, smoke sensor, PIR sensor, Temperature sensor (LM 35, PT-100), Humidity sensor (SY HS 230), Light sensor (LDR), Moisture/rain sensor, Gas sensor (MQ series), AC current sensor (CT-current Transformer), AC voltage sensor (PT-potential transformer), LVDT, Ultrasonic module	(10)

Reference Books:

1. The 8051 Microcontroller and Embedded Systems, M. A. Mazadi, J. G. Mazadi, 2nd Edition, Pearson Education, 2008
2. The 8051 Microcontroller, K. J. Ayala, Penram International Publishing, 2007

B. Sc. Part – III Electronics
Subject: Semester: V Paper- DSE 1005E3
Antenna and Wave Propagation

Mark: 50 **Teaching Hours 36** **Credits 2**

Course Outcomes:

At the end of the course, a student will be able to:

CO1: understand the fundamentals of antenna theory

CO2: get familiarize with different parameters of antenna

CO3: get familiarize with application of antenna according to types of antenna

CO4: create awareness about the different types of propagation of radio waves at different frequencies

Unit	Contents	Hours
1	**Antenna Theory** Antenna as an element of wireless communication system, Antenna radiation mechanism, current distribution on thin wire antenna. Types of Antennas, Fundamentals of EMFT: Maxwell's equations and their applications to antennas	(10)
2	**Antenna Parameters** Radiation pattern, Main Lobe and Side Lobes, Half-power beam width, Radiation intensity, Antenna efficiency, Directivity, Gain, effective area, effective length, Bandwidth, Polarization, input impedance, radiation efficiency	(10)
3	**Radiating wire Structures**(Qualitative idea only) Monopole, Dipole, Folded dipole, Yagi-Uda Antenna, Loop antenna and Bi-conical broadband Antenna Microstrip Antennas: Basics of Microstrip Antennas and its characteristics, feeding methods, design of rectangular Concept of smart antenna: Concept and benefits of smart antennas, Fixed weight beam forming basics, Adaptive beam forming	(08)
4	**Radio Wave Propagation** Different Modes of Wave Propagation, Structure of atmosphere, Ground wave propagation, effect of Earth's Curvature on Ground wave propagation, Space Wave propagation Sky Wave Propagation- Introduction, Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, Virtual Height and Skip Distance, Relation between MUF and skip Distance, Multi-hop Propagation	(08)

Reference Books:

1. Antenna Theory: Analysis and Design, C. Balanis, 3rd Edition, John Wiley & Sons, 2005
2. Antenna Theory and Design, W. L. Stutzman and G. A. Thiele, 2nd Edition, John Wiley & Sons, 1998
3. Antenna & Wave Propagation by K.D. Prasad, 3rd Edition, Satyaprakash, New Delhi, 2007
4. Principles of Electromagnetism, M. N. O. Sadiku, Oxford University Press, 2001

B. Sc. Part – III Electronics
Subject: Semester: V Paper- DSE 1005E4
Programmable Logic Controller (PLC)

Mark: 50 **Teaching Hours 36** **Credits 2**

Course Outcomes:

At the end of the course, a student will be able to:

CO1: understand the basics of control system

CO2: understand the different types of controllers

CO3: describe typical concepts and components of a Programmable Logic Controller

CO4: understand Ladder programming and design basic PLC circuits for entry-level PLC applications

Unit	Contents	Hours
1	**Basics of control system** Introduction, Open loop system, Close loop transfer system, comparison of closed-loop system and open-loop control system, feedback and Feed-forward control system	(06)
2	**Controllers** Introduction to controllers, Properties of controller, Classification of controllers: Two position mode controller (ON-OFF), Proportional mode controller(P), Integral controller(I), Derivative controller(D), Proportional Integral controller(PI), Proportional Derivative controller(PD) and Proportional Integral Derivative controller (PID)	(08)
3	**Introduction to PLC** Programmable logic controller (PLC) basics: Definition, overview of PLC systems, block diagram of PLC, input/output modules, power supplies, isolators, features like scan time, system scale, user interface. Modular PLC and Redundant PLC and Applications Industrial Communication Buses: RS485, Profibus Distributed control system, DCS components/block diagram, SCADA, adaptive control system	(10)
4	**Ladder Programming basics** Basic components: fuse, pushbutton, selector switches, limit switches, indicators, relay, time delay relays functions and symbols. General PLC programming procedures, programming on-off inputs/ outputs. Auxiliary commands and functions, PLC Basic Functions: Register basics, timer functions, counter functions. Ladder Programming: Programs for Boolean logic and flip-flops, counters, timers, flasher. Application program Bottle filling plant, elevator control, washing machine control	(12)

Reference Books:

1. Control Systems, U. A. Bakshi, V.U. Bakshi, 2nd Edition, Technical Publication, 2015
2. Process control Instrumentation Technology, Curtis D. Johnson, 8th Edition, PHI, 2009
3. Computer Based Industrial Control, Krishna Kant, 3rd Edition, PHI, 2004
4. Programmable Logic Control Programming And Applications, John R. Hackworth Frederic D. Hackworth, 4th Edition, Pearson Education India, 2008

B. Sc. Part – III Electronics
Semester: V Paper- SEC 3
Computer Networks

Mark: 50 **Teaching Hours 36** **Credits 2**

Course Outcomes:

At the end of the course, a student will be able to:

CO1: know the fundamentals of computer networks

CO2: get familiarize with different public switched telephone networks

CO3: apply knowledge of transmission media, multiplexing and telephone networks

CO4: design and analyse the computer network protocols

Unit	Contents	Hours
1	**Introduction** The use of computer network, Network Hardware, Network software, The OSI reference models, The TCP/IP reference model, Comparison of OSI & TCP/IP reference models. Physical layer & Transmission: Guided Transmission media – co-axial cable, Fiber optics	(08)
2	**Physical layer & Transmission** FDM, TDM and CDM. Public Switched telephone networks: Structure of Telephone systems, Local loop Modems, ADSL and fiber. Circuit switching, Packet Switching Hybrid Switching. Mobile Telephone systems: From 1G, 2G and 3G	(10)
3	**Data Link Layer** Data Link Layer design issues, Error detection and correction, Elementary data link protocols, sliding window protocols performance. The Medium Access Sub-layer: The local and metropolitan area networks, the ALOHA protocols, IEEE standard 802 for LAN. Ethernet, Bluetooth and RFID	(08)
4	**Network Layer** Design issues, Routing algorithms – optimality principle, shortest path algorithm, flooding, distance vector routing. Congestion control algorithms, Network layer in the Internet. The Transport Layer: Transport service, transport protocols, Internet transport protocol (TCP & UDP)	(10)

Reference Books:

1. Computer Networks, Andrew S. Tanenbaum and David J. Wetherall, 5th Edition, Prentice Hall of India Publishers, 2011
2. Computer Networks, Protocols, Standard and Interfaces, Ulyses Black, 2nd Edition, Prentice Hall of India Pub, 2010
3. Data Communication and Networking, Behrouz. A. Forouzan, 5th Edition, McGraw Hill, 2009
4. Computer Networks: A Systems Approach, Larry L. Peterson, Bruce S. Davie, 4th Edition, Elesvier, 2007

B. Sc. Part – III Electronics
Semester: VI Paper- DSE 1005 F1
Industrial Instrumentation

Mark: 50 **Teaching Hours 36** **Credits 2**

Course Outcomes:

At the end of the course, a student will be able to:

CO1: design and study different OP-AMP circuits

CO2: design and implement active filter circuits

CO3: distinguish analog and digital instruments

CO4: design and implement VCO, V to F and V to F converter using different ICs

Unit	Contents	Hours
1	**Signal Conditioning –I** Introduction, Sample and Hold circuit, Thermistor, Wheatstone bridge amplifier, Instrumentation amplifier, Attenuator, Convertor: V-I, I-V, V-F and F-V	(10)
2	**Signal Conditioning –II** Introduction to Passive and active filter, Advantage of active filters over passive filters. Study of filter response (Butterworth, Chebyshev.) Different types of active filters. Study and design of low pass, high pass, band pass and band stop filters	(10)
3	**Digital Instruments** Introduction to Data Acquisition System (DAS), Single channel & multi channel DAS. Data logger, digital instruments like Digital Multimeter, Digital Tachometer, Digital Capacitance Meter, Digital Phase Meter, Digital Frequency Meter. Digital pH meter	(08)
4	**Application of Linear ICs** Block diagram of PLL with functioning of each block, calculation of capture range and lock range frequencies, application of PLL (frequency multiplier, FM modulator, frequency synthesizer and FSK) Study of IC565, study of function generator IC 8038, study of VCO 556	(08)

Reference Books:

1. Op-amp and Linear Integrated Circuits, Ramakant Gayakwad, 4th Edition, PHI, 1994
2. Electronic Instruments, K.S. Kalsi, 2nd Edition, Tata Mc-Graw Hill, 2006
3. Instrumentation Measurement and analysis, B. C. Nakra, K. K. Chaudhry, 3rd Edition ,Tata McGraw Hill, 2012
4. Linear Integrated Circuits, D. Roy Choudhury, 4th Edition, New Age International, 2012

B. Sc. Part – III Electronics
Semester: VI Paper- DSE 1005 F2
Advanced Microcontroller

Mark: 50 **Teaching Hours 36** **Credits 2**

Course Outcomes:

At the end of the course, a student will be able to:

CO1: understand the architecture and function of each pin of AVR 8-bit Microcontroller

CO2: write, debug and simulate embedded C language programs

CO3: understand Timer operation, Interrupt environment and Serial Communication

CO4: understand the interfacing of various systems with AVR microcontroller

Unit	Contents	Hours
1	**Embedded Systems Design** What is embedded system, embedded system basic blocks, embedded system hardware and software, embedded system characteristics, embedded system applications	(04)
2	**Introduction to AVR microcontroller** Overview of AVR family, ATmega8 pin configuration & function of each pin. AVR Microcontroller architecture, status register, Special function registers, SRAM, ROM & EEPROM space, On-Chip peripherals	(06)
3	**AVR Programming in C** AVR Data types, AVR I/O port programming, Timer programming, Input capture and Wave Generator, PWM programming, External Interrupt programming, ADC programming, Serial Port programming	(10)
4	**Peripheral Interfacing and Embedded System** Interfacing of Switches, Relays, LEDs, seven segment display, 16x2 LCD Interfacing, Stepper interfacing Designing of an Embedded System: DC Motor speed control using PWM technique, Measurement of Temperature of an environment using sensor LM35, Dual channel Digital Voltmeter. (Block diagram, Schematic and Flowchart is only necessary)	(16)

Reference Books:

1. The AVR Microcontroller and Embedded Systems Using Assembly and C, Muhammad Ali Mazidi, Sarmad Naimi and Sepehr Naimi, 1st Edition, Pearson Education, 2017
2. Embedded system design with Atmel AVR microcontroller, Steven F Barrett, 2nd Edition, Morgan & Claypool Publishers, 2018
3. Programming and Customizing the AVR Microcontroller, Dhananjay Gadre, 2nd Edition, McGraw Hill Education, 2012
4. AVR ATmega8 data sheet, 2013
   https://ww1.microchip.com/downloads/en/DeviceDoc/Atmel-2486-8-bit-AVR-microcontroller-ATmega8_L_datasheet.pdf

B. Sc. Part – III Electronics
Semester: VI Paper- DSE 1005F3
Power Electronics

Mark: 50 **Teaching Hours 36** **Credits 2**

Course Outcomes:

At the end of the course, a student will be able to:

CO1: understand basic power electronic devices and their role in power conversion

CO2: understand the types, characteristics, and applications of Thyristors

CO3: understand and analyse performance of controlled and uncontrolled converters.

Unit	Contents	Hours
1	**Power semiconductor devices** Definition of power electronics, Need for semiconductor power devices, Applications of power electronics, classification of power semiconductor devices. **Power diode:** structure, operation, conductivity modulation, I-V characteristics, Reverse recovery effect, series and parallel connection of diode, **Power transistor:** structure, operation, effect of drift layer. Switching characteristics, specifications, Base drive circuits. **Power MOSFET:** MOSFET structure, characteristics, operation and drive circuits	**(10)**
2	**Thyristors** Types of Thyristors, Structure of SCR, SCR Characteristics, two transistor analogy - Methods of turning ON and turning OFF, dv/dt and di/dt protection, gate protection circuits Diac and Triac: Basic structure, working and V-I characteristic, application of a Diac as a triggering device for a Triac IGBT: Structure, characteristics, Operation and drive circuits, Comparison of power transistor, MOSFET and IGBT	**(08)**
3	**Controlled Rectifiers** Basics of single and three phase supply phase and line voltage waveforms, SCR as a static switch, phase controlled rectification, single phase half wave, full wave and bridge rectifiers with resistive & inductive loads. (Analysis of all these circuits with resistive load only)	**(08)**
4	**Power Systems** Power Supplies: Switch mode power supply (DC): flyback, forward, half bridge and full bridge converters. Uninterrupted power supply (UPS), Electronic Ballast, Power factor correction.	**(10)**

Reference Books:

1. Power electronics: circuits, devices, and applications, M.H. Rashid, PHI, 2nd Edition, Pearson Education India, 2009
2. Power Electronics: Converters, Applications and Design, N. Mohan, T. M. Undeland, W.M. Robbins, Wiley India Edition, 2007
3. Power Electronics, Dr. P.S. Bhimbhra, 4th Edition, Khanna Publishers, New Delhi, 2012

B. Sc. Part – III Electronics
Semester: VI Paper- DSE 1005F4
Internet of Things (IoT)

Mark: 50 **Teaching Hours 36** **Credits 2**

Course Outcomes:

At the end of the course, a student will be able to:

CO1: gain knowledge about the architecture of IoT systems

CO2: study the working principle of various types of sensors and actuators used in IoT applications

CO3: explore wireless technologies for IoT and gain an overview of different IoT protocols

CO4: explore cloud platforms used in IoT, including IoT dashboards and various cloud service providers

Unit	Contents	Hours
1	**IoT Introduction & Concepts** IoT Architecture, Physical & Logical IoT design, Basics IoT Enabling, Technologies, IoT Stack, IoT Applications	**(8)**
2	**Sensors & Actuators** Sensor working, Sensor Characteristics, Types of sensors and working principle, Sensors used in IoT	**(8)**
3	**Wireless Technologies for IoT** Overview of Wireless Sensor Networks, IEEE standards for IoT, Overview of Wireless Modems (RF, GSM/GPRS, Bluetooth, Wi-Fi etc.), Node MCU and ESP32 IoT Protocol : Overview, MQTT, COAP, http/https , 6LowPAN	**(10)**
4	**Cloud platforms for IoT** IoT dashboards, Introduction to various cloud platforms, Device and data management from Cloud Platforms, Uploading data from hardware platforms to cloud Applications: Home Automation, Smart Cities etc.	**(10)**

Reference Books:

1. Internet of Things: A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, 2nd Edition, Universities Press, 2013
2. IoT Fundamentals Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, 2nd Edition, Cisco Press, Kindle, 2017
3. Analytics for the Internet of Things(IoT), Andrew Minteer, 1st Edition, Kindle Edition, 2017
4. Designing the Internet of Things, Adrian McEwen, Hakim Cassimally, 1st Edition, Paperback Publications, 2016

B. Sc. Part – III Electronics
Semester: V Paper- SEC 4
Embedded System Design using Arduino

Mark: 50 **Teaching Hours 36** **Credits 2**

Course Outcomes:

At the end of the course, a student will be able to:

CO1: familiarize with Arduino Board & Accessories

CO2: familiarize with Arduino software development environment

CO3: interface the output devices LED, LCD with Arduino

CO4: interface the different types of sensors with Arduino

Unit	Contents	Hours
1	**Introduction to Arduino Board & Accessories** The Arduino Platform, Block diagram, Architecture, Pin functions, overview of main features such as I/O Ports, Timers, interrupts serial port, PWM, ADC	(06)
2	**Arduino IDE** Introduction, Coding style, Arduino compilation, Variables, Arithmetic operators, Relational operators, Increment operator and commenting, for loop, while loop, if statement, if-else statement, Logical operators, Functions	(06)
3	**Display Interfacing** Interfacing Arduino to LED's- blinking single LED, blinking multiple LED's, 7 segment display, traffic light, LED flashes, LED dot matrix, Interfacing to LCD's- Basic LCD control, display a message on LCD display	(12)
4	**Interfacing sensors** Sensors- Definition, Types. Interfacing Arduino to different sensors- light sensor, temperature sensor, humidity sensor, pressure sensor sound sensor, distance ranging sensor, water/detector sensor, smoke, gas, alcohol sensor, ultrasonic range finder	(12)

Reference Books

1. Beginning Arduino, Michal McRoberts, 2nd Edition, Technology In Action, 2013
2. Getting started with Arduino, Massimo Banzi, 2nd Edition, O'relly, 2011
3. Arduino Software: Internals, Norman Dunbar, 2nd Edition, Technology In Action, 2013
4. Arduino I Getting Started, Steven F. Barrett, 1st Edition, Morgan & Claypool Publishers, 2020

ELECTRONICS LAB
Semester - (V & VI)
Credits: 08

GROUP A: (Instrumentation-I & II) ***(minimum 08)***

1. Design of multi-range ammeter, voltmeter, conversion of ammeter into voltmeter
2. Study of temperature sensor RTD and Thermistor
3. Automatic Porch light control using LDR and relay
4. Measurement of displacement using LVDT
5. Study of ON/OFF Temperature controller (LM34/LM35/AD590)
6. Study of Actuator (Solenoid)
7. Study of solid state relay
8. Function generator using IC 8038
9. Instrumentation amplifier using OPAMP
10. Study of active filter : Low and High Pass
11. Study of active filter : Band Pass
12. Study of V to F and F to V using VCO

GROUP B: (Antenna and Power Electronics) ***(minimum 08)***

1. Study of simple dipole $\lambda/2$ antenna
2. Study of folded dipole $\lambda/2$ antenna
3. Study of simple dipole $\lambda/4$ antenna
4. Study of Yagi-Uda with 3 and 5 element simple dipole antenna
5. Study of SCR characteristics (static)
6. SCR firing by UJT
7. AC Voltage controller
8. Speed Control of DC Motor.
9. Phase Shift control of SCR
10. Design of Single phase full wave controlled rectifier
11. To study the simulation of single phase half wave controlled rectifier with R & RL load using MATLAB - Simulink/Scilab
12. To study the simulation of single phase full wave controlled bridge rectifier with R load using MATLAB - Simulink/Scilab

GROUP C: (Microcontroller 8051 & PLC) ***(minimum 08)***

1. Study of Timers in 8051 Microcontroller.
2. LED, Switch and Relay interfacing to 8051 microcontroller.
3. LCD Interfacing with8051 Microcontroller.
4. DC motor interfacing to 8051microcontroller.
5. Stepper Motor interfacing to 8051 microcontroller.
6. DAC0808 interfacing to 8051microcontroller.
7. ADC0804 interfacing to 8051microcontroller.
8. Serial communication with PC using 8051microcontroller
9. Study of PLC Simulator (TriLOGI Software)/ codesys-software/ hardware and implementing Boolean function
10. Programming with PLC (TriLOGI Software)/ codesys-software/ hardware) for sequential logic RS-FF, JK-FF
11. Programming with PLC (TriLOGI Software)/ codesys-software/ hardware) for sequential logic T-FF, D-FF
12. Study of PLC timers and counters in PLC ((TriLOGI Software)/ codesys-software/ hardware)

GROUP D: (AVR and IoT) ***(minimum 08)***

1. Interfacing of Switches and LED with Arduino/AVR microcontroller.
2. LCD Interfacing with Arduino/AVR microcontroller.
3. Stepper Motor Interfacing with Arduino/AVR microcontroller.
4. Interface temperature sensor LM35 with Arduino board and display temperature on LCD.
5. Interface temperature sensor and Humidity Sensor (DHT11) with Arduino/AVR board and display temperature and humidity values on LCD.
6. Accelerometer Sensor Interfacing with Arduino/AVR microcontroller.
7. Study the fundamental of IOT Architecture, Arduino and necessary software and create the thingspeak account
8. Interface Bluetooth with Arduino and send the sensor data to smartphone through Bluetooth
9. Interface Bluetooth with Arduino and receive the data from smartphone through Bluetooth to turn LED ON/OFF
10. Interface wifi module with Arduino to upload sensor data to thingspeak cloud
11. Interface wifi module with Arduino to retrieve data from thingspeak cloud
12. Interface GSM module with Arduino to upload sensor data to thingspeak cloud
13. Read the sensor data and upload the data to thingspeak cloud using NodeMCU
14. Study and implement MQTT protocol using Arduino
15. IoT Application Case study: Home Automation

Distribution of Marks for Practical Examination (LAB):

Group	A	B	C	D	Project	Journal	Industrial Visit	Seminar	Total
Marks	35	35	35	35	40	08	04	08	200

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Evaluation Pattern:

Semester	Course codes	End Semester Examination Marks	CIE/Internal assessment Marks and Pattern	Practical Examination Marks	Total Marks
III	DSC-1005 E1	35	15 (Test)	-	50
	DSC-1005 E2	35	15 (Test)	-	50
	DSC-1005 E3	35	15 (Test)	-	50
	DSC-1005 E4	35	15 (Test)	-	50
IV	DSC-1005 F1	35	15 (Test)	-	50
	DSC-1005 F2	35	15 (Test)	-	50
	DSC-1005 F3	35	15 (Test)	-	50
	DSC-1005 F4	35	15 (Test)	-	50
	DSC-1005 E and DSC-1005 F	-	-	200 (Annually)	200

Distribution of Marks for Practical Examination (LAB): Total Marks: 200

Exam. types	Experiment Groups				Project			Journal	Industrial Visit/Study Tour	Seminar	Total
	A	B	C	D	Circuit Built	Report	Vivo				
Max. Marks	35	35	35	35	20	10	10	08	04	08	200

Nature of Question Paper:

Seat No.	

Ques. paper code	

VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

B.Sc. Part- III (Electronics) (Semester-V) Examination.....

Course Code and Name: DSE-1005 E1: Fundamentals of Instrumentation

Day: Time: 2 hours

Date: --/--/---- Marks : 35

Instructions:

1) All the questions are compulsory.

2) Figures to the right indicate full marks.

3) Draw neat labeled diagrams wherever necessary.

4) Use of log table/calculator is allowed.

Q. 1. A] Select correct alternative (One mark each): **[5]**

i) Xyzabcdefghijklmnop ----------

a) -------- b) -------- c) -------- d) --------

ii) Xyzabcdefghijklmnop ----------

a) -------- b) -------- c) -------- d) --------

iii) Xyzabcdefghijklmnop ----------

a) -------- b) -------- c) -------- d) --------

iv) Xyzabcdefghijklmnop ----------

a) -------- b) -------- c) -------- d) --------

v) Xyzabcdefghijklmnop ----------

a) -------- b) -------- c) -------- d) --------

Q. 1. B] Fill in the blanks (One mark each): **[2]**

i) Xyzabcdefghijklmnop ----------

ii) Xyzabcdefghijklmnop ----------

Q.2. Attempt any TWO (Eight marks each): **[16]**

i) Xyzabcdefghijklmnop.

ii) Xyzabcdefghijklmnop.

iii) Xyzabcdefghijklmnop.

Q.3. Attempt any THREE (Four marks each): **[12]**

i) Xyzabcdefghijklmnop.

ii) Xyzabcdefghijklmnop.

iii) Xyzabcdefghijklmnop.

iv) Xyzabcdefghijklmnop.

v) Xyzabcdefghijklmnop.