K. C. E. SOCIETY'S

MOOLJI JAITHA COLLEGE, JALGAON

Department of Physics and Electronics

Academic Year:2020-21

Name of Teacher:	K. B. Mahajan	Class:	T.Y.B.Sc. Electronics
Subject/Paper :	Electronic Instrumentation	Faculty:	Science
Semester :	I	Paper Code	ELE – 504

Month	Topic	Lectures Allotted	Review (Complete/ Incomplete)	Action plan if incomplete
August	**UNIT-1**:Basic Measurement Concepts, Measurement systems, Fundamental elements of measurement system, Static and Dynamic characteristics, Accuracy and Precision, Sensitivity, Linearity, Resolution, Repeatability; Errors such as Gross error, Systematic error, Absolute and Relative error, Random error **UNIT-2:**Transducers and sensors: Classification of transducers, Basic requirement/ characteristics of transducers, active & passive transducers,	08 04	Completed Completed	
September	Resistive (Potentiometer, Strain gauge– Working Principle and applications), Capacitive (Variable Area Type – Variable Air Gap type – Variable Permittivity type), Inductive (LVDT) and piezoelectric transducers. **UNIT-3**:Signal generators and Oscilloscopes Signal Generators: Introduction, Block diagram of standard signal generator, AF sine and square wave generator, Function generator, Square and Pulse generator, Sweep generator, Frequency synthesizer.	04 08	Completed Completed	
October	Cathode Ray Oscilloscopes (CRO)-block diagram, front panel controls, and measurement of amplitude, frequency and phase. Dual trace and dual beam CRO. **UNIT-4:** Digital Measuring Instruments Digital Storage Oscilloscope (DSO)-Block diagram, advantages and applications. Digital Multimeter (DMM)-Block diagram and working, Digital Frequency Meter (DFM)-Working principle, Block diagram, measurement of frequency and time	04 09	Completed Completed	
November	**UNIT-5 :** Data Acquisition System and Data logger DAS: Introduction, general block diagram of DAS, Single channel and multi-channel DAS, PC based data acquisition, ADC and DAC, Typical on board DAQ card, Representation of analog signals in the digital domain, Resolution and sampling frequency, Multiplexing of analog inputs, Singleended and differential inputs, Different strategies for sampling of multichannel analog inputs. Concept of universal DAQ card. Data Loggers: Characteristics of data loggers, Block diagram and basic operation of data logger.	08	Completed	

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MOOLJI JAITHA COLLEGE, JALGAON

Department of Physics and Electronics

Academic Year:2020-21

Name of Teacher: K. B. Mahajan | Class: M.Sc. Physics

Subject/Paper : Computer Network | Faculty: Science

Semester : II | Paper Code ELE-604

Month	Topic/s to be Covered	Lectures Allotted	Review (Complete/ Incomplete)	Action plan if incomplete
February	**Unit 1:** Fundamentals of Computer Network 1.1.Needs, uses of Computer Network, Applications of Computer, Network, Benefits of Computer Network: Sharing of Information, Sharing Resources, Centralized Management of resources, backing up of data. 1.2.Classification of Networks: Geographical Classification, Classification Based on Transmission Technology, Classification Based on Network Relationships 1.3.Basics of network computing models: per-to-peer, client server, distributed Network Operating System (NOS): its types, features and applications **Unit2:** Network Components and Topologies: 2.1.Basic Components of Computer Network: Cables. Host, Communication Subnet. NJC. 2.2.Network Devices and their role: Repeaters, Hub, Bridge, Switches, Router 2.3.Network Topologies: Concept Significance, Bus, Star, Ring, Tree, Mesh,	08 08	Completed completed	
March	**Unit 3:** Reference Models for Computer Networks: 3.1.Protocol Hierarchies-Layered Approach 3.2.Interfaces, Services, Protocols and Packets 3.3.Design issues for layering. 3.4.OSI reference Model: layers and their functions. 3.5.TCP/JP Protocol: Layers and their functions 3.6.OSI Model Vs.TCP/IP **Unit 4:** TCP/IP Protocol Suite: 4.1.Host-to-Network Layer Protocols: SLIP ,PPP 4.2.Internet Layer Protocols: IP, ARP,RARP,ICMP. 4.3.Transport Layer Protocols: TCP, UDP. 4.4.Application Layer Protocols: FTP, HTTP, SMTP, TELNET, DNS, BOOTP, DHCP	08 08	Completed completed	
April	**Unit 5:** Wireless LANS & Virtual Circuit Networks 5.1.Introduction, 5.2.Wireless LANS: IEEE 802.11 project, 5.3.Bluetooth, Zigbee. 5.4.Connecting devices and Virtual LANS **Unit 6:** Introduction and Cloud Computing Technology: 6.1.Shift from distributed computing to cloud computing; 6.2.Principles and characteristics of cloud computing- IaaS, PaaS, SaaS;	05 04	Completed completed	
May	6.3.Service oriented computing and cloud environment, 6.4.Client systems, Networks, Server systems and security from services perspectives, 6.5.Accessing the cloud with platforms and applications; cloud storage.	04		

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TEACHING PLAN

ACADEMICYEAR:**2020-21** NAME OF TEACHER: **Dr V.R.Khadse**

FACULTY: Science DEPARTMENT: Physics and Electronics

CLASS:S.Y.B.Sc SUBJECT: Electronics

PAPER CODE and TITLE OF PAPER:ELE 230: Sensors and Transducers**(SEC)**

FIRST TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	Review (Complete/ Incomplete)	Action plan if incomplete
July	**Unit:-I**-General concepts and terminology of measurement systems, transducer classification, general input-output configuration, static and dynamic characteristics of a measurement system, Statistical analysis of measurement data. Resistive transducers: Potentiometers, metal and semiconductor strain gauges and signal conditioning circuits, strain gauge applications: **Unit-II**-Temperature measurement: Introduction to temperature measurements Load and torque measurement.	**09**	Completed	
August	Thermocouple, Resistance Temperature Detector, Thermistor and its measuring circuits, Radiation pyrometers and thermal imaging. Pressure measurement: Introduction, definition and units, Mechanical, Electro-mechanical pressure measuring instruments. Low pressure measurement, Transmitter definition types, I/P and P/I Converters. **Unit-III**-Self and mutual inductive transducers- capacitive transducers, eddy current transducers, proximity sensors, tacho generators and stroboscope.	**09**	Completed	
Septem ber	Piezoelectric transducers and their signal conditioning, Seismic transducer and its dynamic response, photoelectric transducers, Hall Effect sensors, Magneto strictive transducers, Basics of Gyroscope. Digital displacement sensors, Fiber optic sensor, Semiconductor sensor and Smart sensors **Unit-IV**- Level measurement: Introduction, Mechanical and electrical methods of level measurement. Flow measurement: Introduction, definition and units	**09**	Completed	
October	classification of flow meters, differential pressure and variable area flow meters, Positive displacement flow meters, Electro Magnetic flow meters.	**03**	Completed	

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TEACHING PLAN

ACADEMICYEAR:**2020-21** NAME OF TEACHER:**Dr V.R.Khadse**

FACULTY: Science DEPARTMENT: Physics and Electronics

CLASS:T.Y.B.Sc SUBJECT: Electronics

PAPER CODE and TITLE OF PAPER:ELE – 601 Power Electronics

SEM-II

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	Review (Complete/ Incomplete)	Action plan if incomplete
Sept	UNIT-1 Power Devices: Need for Semiconductor Power Devices, Power Diodes, Enhancement of Reverse Blocking Capacity, Introduction to Family of Thyristors. Basic Structure, symbol, working	04	Completed	
Oct	I-V Characteristics, Applications of SCR, DIAC and TRIAC. Ratings: Latching Current, Holding Current, dv/dt & di/dt rating, I2 t rating, surge current rating. List of applications of SCR UNIT-2 Switching circuits for SCR Methods of Triggering: Gate triggering, Voltage triggering	11	Completed	
Nov	Thermal triggering and Radiation triggering, Triggering of SCR using UJT, Triggering of SCR using BJT. Turn off circuits- Natural & Forced Commutation, types of forced commutation (all classes). UNIT-3 Controlled Rectifiers Single Phase Circuits: Thyristor half wave Rectifier (Resistive load), Thyristor half wave Rectifier (Inductive load), Thyristor Full Converter (Resistive load), Thyristor Full Converter (Inductive load)	11	Completed	
Dec	UNIT-4 Inverters and Converters Inverters - Introduction, Industrial applications, types of inverters, Single Phase Bridge inverter, Single Phase Centre Tapped Inverter, Series Inverter. Converters (choppers) - Introduction, Principle of Step down Chopper (variable frequency and constant frequency control), Step up chopper, Chopper Classification, Chopper Configurations UNIT-5 Applications of SCR and High frequency heating Applications of SCR - Uninterruptible power supplies, over voltage protection,	11	Completed	
Jan	simple battery charger, fan regulator using DIAC and TRIAC. High frequency heating applications - Induction heating – principle, application as induction heater Dielectric Heating – principle, application in sterilization	08	Completed	

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TEACHING PLAN

ACADEMICYEAR:**2020-21** NAME OF TEACHER:**Dr V.R.Khadse**

FACULTY:Science DEPARTMENT:Physics and Electronics

CLASS:T.Y.B.Sc SUBJECT:Physics

PAPER CODE and TITLE OF PAPER:PHY 504(B): Instrumentation-II

FIRST TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	Review (Complete/ Incomplete)	Action plan if incomplete
Sept	**Unit 1:** Introduction to Instrumentation Definitions: Resolution, Threshold, Range and span, Hysteresis, Dead band, Backlash, Drift, Impedance loading and matching. Functional elements of measurement system (Brief description), Classification of instruments- Deflection and Null type	**04**	Completed	
Oct	Manually operated and automatic type, Analog and Digital types, Self-generating and power-operated types, Contacting and Non-contacting types. Dynamic Characteristics of Instruments: Dynamic response of zero order, First order, & Second order instrument **Unit 2**: Transducers Introduction, Analog transducers- Electromechanical type, Potentiometric Resistance-type, Inductive type, Self-generating type, Non-self generating type, Capacitance type, Piezo-electric type, Resistance strain gauges	**11**	Completed	
Nov	Opto-electric transducer, Digital transducers: Frequency domain transducers, Digital encoders, Optical encoders, Shaft encoder. **Unit 3:** Data Acquisition Systems Introduction, Data converters, Digital to analog converters- Binary weighted and R-2R ladder. Analog to digital converters - Successive approximation method, Single and dual slope integration type ADC	**11**	Completed	
Dec	Data transmission elements-Electrical-type, Pneumatic-type, Position type, Radio-Frequency type. **Unit 4:** Data Presentation Systems Indicating elements- Digital voltmeters, Digital Multimeter, CRO (Analog & Digital),Recorders- Strip chart, X-Y recorder	**11**	Completed	
Jan	Digital data recording (CD Recording system).Display elements- Classification of displays, Display devices- LED, LCD, 7-segment display, Dot matrix display, Electro luminescent display.	**08**	Completed	

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TEACHING PLAN

ACADEMICYEAR:**2020-21** NAME OF TEACHER:**Dr V.R.Khadse**

FACULTY:Science DEPARTMENT:Physics and Electronics

CLASS:T.Y.B.Sc SUBJECT:

PAPER CODE and TITLE OF PAPER:PHY 605: Basic Instrumentation Skills

Sem-II

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	Review (Complete/ Incomplete)	Action plan if incomplete
March	Unit 1. Use of basic measuring instruments: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. Study of Vernier calliper, Screw gauge, travelling microscope and their utility to measure the dimension of a solid block, volume of cylindrical objects, diameter of a thin wire and capillary tube, thickness of metal sheet, etc. Use of Sextant to measure height of buildings, mountains	04	Completed	
April	Unit 2. Electrical quantity measuring instruments: PMMC, Voltmeter (D.C. and A.C), specifications and their significance. Ammeter (D.C. and A.C), specifications and their significance. Ohmmeter (Series and Shunt type), specifications and their significance. Multimeter, Steps of measurement of dc voltage and dc current, ac voltage, ac current and resistance using multimeter, Specifications of a multimeter and their significance.	12	Completed	
May	Unit 3: Cathode Ray Oscilloscope Block diagram of basic CRO, Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only– no mathematical treatment), brief discussion on screen phosphor, visual persistence and chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance, Use of CRO for the measurement of voltage (dc and ac), frequency, time period and phase. Introduction of Dual trace CRO and digital oscilloscope, probes.	12	Completed	
June	Unit 4: Signal Generators and Analysis Instruments Block diagram, explanation and specifications of low frequency signal generators, pulse generator, and function generator. Brief idea for testing, specifications Unit 5: Digital Instruments Principle and working of digital meters. Comparison of analog and digital instruments. Characteristics of a digital meter. Block diagram and Working principle of digital voltmeter (Ramp type only).	09	Completed	
July	Block diagram and working of a digital multimeter, Digital Frequency meter: Block diagram and Working principle: frequency and period measurement, accuracy and resolution	08	Completed	

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TEACHING PLAN

ACADEMICYEAR: 2020-21 NAME OF TEACHER: Mr. Kishor Shridhar Bonde
FACULTY: Science DEPARTMENT: Physics/Electronics
CLASS: F.Y.B.Sc. SUBJECT: Electronics
PAPER CODE and TITLE OF PAPER: ELE-121: Analog Electronics

SECOND TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
June	**Unit 1: Bipolar Junction Transistor:** Construction and operation of BJT (NPN and PNP Transistor), Transistor circuits configuration CB, CE and CC configuration (circuits diagram and comparison). I-V characteristics of transistor in CE configuration (Input and output characteristics). h parameter of an Ideal CE transistor, Regions of operation (active, cut off and saturation), Current gains α and β. Relations between α and β. dc load line and Q point.	06	
July	**Unit 2: Amplifiers:** Transistor as an amplifier, Need of transistor biasing, Inherent variation of Transistor parameter, Stabilization, Method of transistor biasing - Fixed Bias and Voltage Divider Bias. Thermal runaway and stability factor (Derivation not expected). Classification of amplifiers (Class A, Class B, Class C) Single and two stage RC Coupled Amplifier (circuit diagram and working) and its Frequency Response. **Unit 3: Feedback and oscillators:** Concept of feedback, Types of feedback, Advantages of negative feedback in amplifier (Qualitative only). Oscillator- Classification of oscillator.	16	
August	Tank circuit, Barkhausen criterion for sustained oscillations. Phase shift and Colpitt's oscillator-circuit diagram and working. **Unit 4: Unipolar Devices:** Symbol, types, construction, working principle, I-V characteristics, Specifications parameters of: Uni-Junction Transistor (UJT). Junction Field Effect Transistor (JFET), Metal Oxide Semiconductor FET (MOSFET), comparison of JFET, MOSFET and BJT.	08	

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TEACHING PLAN

ACADEMIC YEAR: **2020-21** NAME OF TEACHER: **Prof.R.R.Attarde**

FACULTY: **Science** DEPARTMENT: **Physics**

CLASS: **F.Y.B.Sc** SUBJECT: **Electronics**

PAPER CODE and TITLE OF PAPER: **ELE-112**, **Digital Integrated Circuits, Sem-I**

FIRST TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
Oct-2020 19/10/2020	**Number System and Codes**: Decimal, Binary,Octal and Hexadecimal number systems, base conversions…..	04	
Nov-2020	base conversions, Representation of signed and unsigned numbers, BCD code (8421), Gray code, Binary addition, Subtraction by 1's and2's complement method.	06	
Dec-2020	Octal and hexadecimal addition and subtraction, **Logic Gates and Boolean algebra:** Logic symbol and Truth Tables of OR, AND, NOT, NOR, NAND, XOR, XNOR, NAND and NOR as universal Gates, Basic postulates and fundamental theorems of Boolean algebra….	09	
Jan-2021	**Combinational Logic Analysis and Design**: Standard representation of logic functions (SOP & POS), Min and max terms, Minimization Techniques (Karnaugh map minimization up to 4 variables for SOP). Arithmetic Circuits: Binary Addition. Half and Full Adder Data processing circuits: Multiplexers (2:1 and 4:1), De-multiplexers (1:2 and 1:4), Decoders (BCD to Decimal Decoder), Encoders (Decimal to BCD Encoder).	08	
Feb-2021	**Sequential Circuits**: S-R, D, J-K and T Flip flop, Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in J-K Flip-Flop. Master-slave J-K Flip-Flop. Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only 4 bits). Counters (4 bits): Asynchronous counters, Decade Counter. Synchronous Counter.	08	

Prof.R.R.Attarde
(Teacher)

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Dr.K.B.Mahajan
(H.O.D.)

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TEACHING PLAN

ACADEMIC YEAR: **2020-21** NAME OF TEACHER: **Prof.R.R.Attarde**

FACULTY: **Science** DEPARTMENT: **Physics**

CLASS**: S.Y.B.Sc** SUBJECT: **Physics**

PAPER CODE and TITLE OF PAPER: **PHY-230, Basic Instrumentation Skill (SEC)**

FIRST TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
June	Admission Process		
July	Admission Process		
Aug	**Fundamentals of Measurements:** Aim of measurement, Functional elements of typical measurement system, Standards of measurements and calibration, Static performance characteristics: Accuracy, Precision, Accuracy versus precision, Sensitivity, Linearity, Error in measurement: Concept of Errors and, types (systematic, random & miscellaneous error), way of expressing error in measurement. **Measurement of Temperature:** Non - electrical Methods: Liquid- in-glass Thermometer, Pressure Thermometer construction and their types: constant volume gas thermometer, Vapour pressure Thermometer,	06	
Sept	Electrical Methods: Thermo-electric Sensors(Thermocouple), Metallic resistance Thermometer(Platinum resistance thermometer),Semiconductor resistance sensors (Thermistor). **Measurement of Pressure:** High pressure Measurement, Measurement of low pressure (Vacuum): McLaud Guage, Calibration & Testing (Dead - weight tester). **Acoustics (Sound) Measurement:** Characteristics of sound, Sound pressure level, Sound power level	08	
Oct	Variation of intensity of sound with distance, Typical sound measuring system (Sound level Meter), Microphones : Condenser or capacitor type Microphone, Electrets Microphone, Electrodynamics types of Microphone, Carbon granules type Microphone, **Measurement of Magnetic Field and Use of CRO:** Introduction to magnetic materials, Hysterisis loop and its application, Measurement of magnetic field by Hall probe. CRO: Block diagram of CRO, Application of CRO: 1) study of waveform, 2) Measurement of voltage, current frequency and phase difference.	08	

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MOOLJI JAITHA COLLEGE, JALGAON

TEACHING PLAN

Academic Year 2020 - 21

Name of Teacher:- Mr. P. G. JADHAV
Department:- Physical Science
Class:- F.Y.B Sc. (PHYSICS)
Title of Paper:- BASIC MECHANICS

Faculty:- Science
Semester: - I
Paper: - I
Paper Code:- PHY – 111

Month	Topic/s to be Covered	No of Lectures Required	Review (Complete / Incomplete)	Action plan if incomplete
October	**1. Vectors:** Vector algebra, Scalar and vector products, Derivatives of a vector with respect to a parameter.	04	Completed	
November	**2. Ordinary Differential Equations:** Types of differential equations, degree and order of differential equation (definitions only), linear and non-linear differential equations (definitions only), homogeneous and non-homogeneous differential equations (definitions only)1st order homogeneous differential equations, 2nd order homogeneous differential equations with constant coefficients (definitions with examples).	08	Completed	
December	**3. Laws of Motion:** Frames of reference, Newton's Laws of motion, Dynamics of a system of Particles, Centre of Mass.	10	Completed	
January	**4. Momentum And Energy –** Conservation Of Momentum, Work And Energy, Conservation Of Energy, Motion Of Rocket**.**	04	Completed	
February	**5. Rotational Motion –** Angular Velocity And Angular Momentum, Torque, Conservation Of Angular Momentum**.**	04	Completed	

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MOOLJI JAITHA COLLEGE, JALGAON

TEACHING PLAN

Academic Year 2020 - 21

Name of Teacher:- Mr. P. G. JADHAV
Faculty:- Science
Department:- Physical Science
Semester: - I
Class:- F.Y.B Sc. (PHYSICS)
Paper: - II
Title of Paper:- DYNAMICS AND ELASTICITY
Paper Code:- PHY – 112

Month	Topic/s to be Covered	No of Lectures Required	Review (Complete/ Incomplete)	Action plan if incomplete
October	**1. Gravitation:** Newton's Law of Gravitation, Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant), Kepler's Laws (statement only), satellite in circular orbit and applications, Geosynchronous orbits, Weightlessness, Basic idea of global positioning system (GPS).	08	Completed	
November	**2. Oscillations:** Simple harmonic motion, Differential equation of SHM and its solutions, Kinetic and Potential Energy, Total Energy and their time averages, Damped oscillations.	07	Completed	
December	**3. Elasticity:** Hooke's law, Stress-strain diagram, Elastic moduli, Relation between elastic constants, Poisson's Ratio, Expression for Poisson's ratio in terms of elastic constants, Work done in stretching and work done in twisting a wire, Twisting couple on a cylinder,	04	Completed	
January	**3**. Determination of Rigidity modulus by static torsion, Torsional pendulum, Determination of Rigidity modulus and moment of inertia - q, η and σ by Searles method. **4. Viscosity:** Introduction, definition of viscosity, general concept of fluid flow, Streamline and turbulent flow,	04 02	Completed	
February	Energy possessed by a liquid and Bernoulli's Theorem and its application: venturimeter, Rate flow of liquid in a capillary tube-Poiseuille's formula, determination of coefficient of viscosity of a liquid by using Poiseuillie's equation, variations of viscosity of a liquid with temperature.	05	Completed	

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MOOLJI JAITHA COLLEGE, JALGAON
TEACHING PLAN
Academic Year 2020 - 21

Name of Teacher:- Mr. P. G. JADHAV | Faculty:- Science
Department:- Physical Science | Semester: - I
Class:- T.Y.B Sc. (ELECTRONICS) | Paper: - I
Title of Paper:- Advanced Digital System Design using VHDL | Paper Code:- PHY – 302

Month	Topic/s to be Covered	No of Lectures Required	Review (Complete/ Incomplete)	Action plan if incomplete
September	**Introduction to VHDL –** Introduction, library, entity, architecture, modeling style, concurrent and sequential statements, identifier, data object and data types, attributes.	05	Completed	
October	**Combinational Logic Circuits -** Introduction to combinational circuits, Revision of K-Map, Combinational logic examples (half and full adder, full subtractor, four bit binary adder, multiplexer and demultiplexers, any combinational circuits up to 3 input) *Ref. 1. (N. G. Palan)* *VHDL Programming:* half and full adder, full subractor, four bit binary adder, multiplexer and demultiplexers Idea of seven segment display (Common anode, common cathode) and designing of BCD to seven segment decoder. *Ref. 1 (N. G. Palan)*	12	Completed	
November	**Flip Flop Circuits** Introduction to R-S, J-K, T and D flip flops, Excitation table of flip flops, flip flop conversions: R-S to J-K, S-R to T, J-K to D and T to D *VHDL Programming:* Flip flops S-R, D, J-K, J-K master Slave and T Applications of Flip flops, *Ref. 2 (A. Anand kumar)*	14	Completed	
December	**Sequential Logic Design** State table, state diagram, state equation and state reduction in sequential logic design, Brief revision of counters: Design of Asynchronous counters - Design of Mod-6 counter using T flip flop, Design of Mod-10 counter using T flip flop *VHDL Programming:* Mod-6 asynchronous counter	07	Completed	
January	***Design of Synchronous counters***- Design of synchronous 3 bit up-down counter using J-K flip flop, Design of synchronous 3 bit up counter, Design of synchronous 3 bit down counter, Design of synchronous Mod-10 bit up-down counter using T flip flop, Design of synchronous modulo 6 Grey code counter. *VHDL Programming:* 3 bit up-down counter.	07	Completed	

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K.C.E. Society's

MOOLJI JAITHA COLLEGE, JALGAON
TEACHING PLAN
Academic Year 2020 - 21

Name of Teacher: - Mr. P. G. JADHAV
Faculty: - Science
Department: - Physical Science
Semester: - I
Class: - M.Sc.I (PHYSICS)
Paper: - II
Title of Paper: - CLASSICAL MECHANICS
Paper Code: - PHY – 102

Month	Topic/s to be Covered	No of Lectures Required	Review (Complete / Incomplete)	Action plan if incomplete
March	**UNIT 1: ENERGY AND WORK** Conservative force, potential energy, conservative momentum and angular momentum, conservative system of particles of mass, motion of COM, conservation theorems & equation of motion under different types of forces. **UNIT 2: The Langrangian Formulation Of Mechanics -** Generalized coordinates, DoF, configurational space, constraints, D'Alembert's principle and Lagrange's equations, kinetic energy in generalized coordinates, generalized momentum and energy, Gauge invariance, cyclic or ignorable coordinates.	12 12	Completed	
April	**UNIT 3: Hamiltonian Dynamics -** Hamilton's principle and Lagrange's equations, Lagrange's equation for non-holonomic systems, few examples of Lagrange's equation of motion, method of undetermined multipliers, the Hamiltonian of the dynamical system, Hamilton's canonical equations, canonical transformations, Poisson's bracket, phase space, Lagrange from Hamiltonian, few application of Hamiltonian formulation. **UNIT 4: CENTRAL FORCE MOTION -** The two body problem and the reduced mass, general properties of central force motion, effective potential and classification of orbits, general solutions, inverse square law of the force, Keple's law of planetary motion.	12 12	Completed	
May	**UNIT 5: COUPLED OSCILATIONS –** Coupled pendulum, normal coordinates, coupled oscillators and normal oscillators, and normal modes, equation of motion of a coupled system, normal modes of oscillation, orthogonality of Eigenvectors, normal coordinates.	12	Completed	

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MOOLJI JAITHA COLLEGE, JALGAON
TEACHING PLAN
Academic Year 2020 - 21

Name of Teacher: - Mr. P. G. JADHAV
Faculty: - Science
Department: - Physical Science
Semester: - I
Class: - S.Y.B.Sc. (PHYSICS)
Paper: - III
Title of Paper: - Practicals
Paper Code: - PHY – 233

Month	Topic/s to be Covered	No of Lectures Required	Review (Complete/ Incomplete)	Action plan if incomplete
October	1. Verification of De Morgan's Theorems (using ICs). 2. Study of logic gates (AND, OR and NOT) using diodes and transistors.	04	Completed	
November	1. To determine fill factor and efficiency of solar cell. 2. Comparison of luminous intensities of two light sources by using photo voltaic cell.	04	Completed	
December	1. To study the characteristics of Light Emitting Diode (LED). 2. To determine the temperature co-efficient of resistance by Platinum resistance thermometer.	04	Completed	
January	1. To determine the coefficient of thermal conductivity of a bad conductor by Lee's method and Charlton's disc method. 2. To determine the coefficient of thermal conductivity of copper by Searle's Apparatus.	04	Completed	
February	1. To determine Stefan's constant 2. To determine characteristics of thermistor and to find an unknown temperature by using thermistor.	04	Completed	

H. O. D. **Principal** **Teacher**

K.C.E. Society's

MOOLJI JAITHA COLLEGE, JALGAON

TEACHING PLAN

Academic Year 2020 - 21

Name of Teacher: - Mr. P. G. JADHAV
Faculty: - Science
Department: - Physical Science
Semester: - II
Class: - F.Y.B.Sc. (Physics)
Paper: - II
Title of Paper: - MAGNETISM AND ELECTROMAGNETISM
Paper Code: - PHY-122

Month	Topic/s to be Covered	No of Lectures Required	Review (Complete/ Incomplete)	Action plan if incomplete
JUNE	**Capacitance and dielectrics:** Introduction, Capacitance of an isolated spherical conductor, Parallel plate, spherical and cylindrical condenser, Energy per unit volume in electrostatic field, Dielectric medium, Polarisation, Displacement vector, Gauss's theorem in dielectrics, Parallel plate capacitor completely filled with dielectric.	10	Completed	
JULY	**Magnetism:** Magnetic properties of materials: Magnetic intensity, magnetic induction,permeability, magnetic susceptibility, Brief introduction of dia-, para- and ferro-magnetic materials. Introduction of Magnetostatics: Biot-Savart's law & its applications-straight conductor, circular coil, solenoid carrying current, Divergence and curl of magnetic field, Magnetic vector potential, Ampere's circuital law.	08	Completed	
AUGUST	**Electromagnetic Induction:** Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils, Energy stored in magnetic field. **Maxwell`s equations and Electromagnetic wave propagation:** Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, polarization.	12	Completed	

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K.C.E. Society's
MOOLJI JAITHA COLLEGE, JALGAON
TEACHING PLAN
Academic Year 2020 – 21

Name of Teacher: - Mr. P. G. JADHAV
Faculty: - Science
Department: - Physical Science
Semester: - II
Class: - S.Y.B.Sc. (Physical Science)
Paper: - II
Title of Paper: - OPTICS
Paper Code: - PHY – 242

Month	Topic/s to be Covered	No of Lectures Required	Review (Complete/ Incomplete)	Action plan if incomplete
March	**Unit I: Geometrical Optics:**The nature of light, Images by Reflection, Refraction, Dispersion, Snell's law, Lenses Deviation produced by thin lenses, equivalent focal length of two thin lenses separated by a distance and when in contact. Power of lens, Spherical aberration in lens, reduction of spherical aberration, Definition and Properties of wave front. Huygens Principle.	07	Completed	
April	**Unit II: Interference:** Phase change on reflection [Stoke's treatment], Interference due to thin film i] Uniform thickness: Reflection and Transmission, ii] Wedge shaped film: Reflection and Newton's ring, Colors in thin film, Principle construction and working of Michelson interferometer, Applications of Michelson Interferometer, i] Determination of thickness of transparent media, ii] Resolution of spectral lines, iii] Standardization of meters.	08	Completed	
May	**Unit III: Diffraction:** Definition, difference between interference and diffraction, types of diffraction Fresnel's diffraction: i] Diffraction at straight edge and thin wire, ii] Diffraction at circular aperture, rectangular aperture and circular disc, iii] Zone plate: Derivation of focal length and comparison with converging lens , Fraunhoffer's Diffraction, i] Diffraction through Single slit, double slit and grating, Rayleigh criteria for resolution, Resolving power of telescopes and microscopes, Dispersive and resolving power of grating	07	Completed	
June	**Unit IV: Polarization:** Polarization of transverse waves, Polarization by reflection, Biot's polariscope, Brewster's law and Brewster's window Pile of plates, Malus law, Double refraction: Huygen's explanation of double refraction in uniaxial crystal, Nicol prism,	04	Completed	
July	Nature of refraction for different position of optical axis [parallel, Perpendicular, oblique to crystal surface], Elliptically and circularly polarized light, Quarter wave plate, production and detection of plane, circularly and elliptically polarized light, Optical Activity: Fresnel's experiment and explanation of rotation, Polarimeter	04	Completed	

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K.C.E. Society's
MOOLJI JAITHA COLLEGE, JALGAON
TEACHING PLAN
Academic Year 2020 - 21

Name of Teacher: - Mr. P. G. JADHAV
Faculty: - Science
Department: - Physical Science
Semester: - II
Class: - M.Sc.I (Physical Science)
Paper: - II
Title of Paper: - CLASSICAL ELECTRODYNAMICS
Paper Code: - PHY – 201

Month	Topic/s to be Covered	No of Lectures Required	Review (Complete/ Incomplete)	Action plan if incomplete
June	**UNIT-1: ELECTROSTATICS AND MAGNETOSTATICS -**The electric field, continuous charge distribution, divergence and curl of electrostatic fields,Gauss law and applications, electric potentials, Poison‟s equations and Laplace equation, the potential of localized charge distribution, electrostatic boundary condition, work and energy in electrostatics. Biot-Savart‟s laws, divergence and curls of B, Amperes law and its applications, magnetic vectors potential: the vector potential, magnetostatic boundary conditions, multipole expansion of the vector potential **UNIT-2: SPECIAL TECHNIQUES-** Laplace equation in one, two and three dimensions, boundary conditions and uniqueness theorems, The method of images, the classic image problem, other image problems, spherical coordinates, multipole expansion, approximate potentials at large distances, the monopole and dipole terms, origin of coordinates in multipole expansions	10 10	Completed	
July	**UNIT-3: ELECTRODYNAMICS -** Electromotive force, electromagnetic induction: Faradays law, The induced electric field, Inductance, energy in magnetic fields, Maxwell‟s equation‟s: Electrodynamics before Maxwell, How Maxwell fixed Amperes law?, Maxwell‟s equations, magnetic charge, Maxwell‟s equations in matter, boundary conditions, conservation laws, the continuity equation and Pointing‟s theorem. **UNIT-4: ELECTROMAGNETIC WAVES-** Boundary conditions, reflection and transmission, polarization, Electromagnetic waves in vacuum, wave equations for E and B, monochromatic plane waves, energy and momentum in electromagnetic waves, electromagnetic waves in matter, propagation in linear media, R and T at normal incidence, absorption and dispersion, electromagnetic waves in conductors, reflection at conducting surface, guided waves, wave guides, TE waves in rectangular waveguides, the coaxial transmission line 18	10 12	Completed	
August	**UNIT-5: POTENTIAL FIELDS -** The potential formulation, scalar and vector potentials, gauge transformations, Coulomb and Lorentz‟s gauge, Continuous distributions: retarded potentials, Jefimenko‟s equations, Point charges: Lienard-Wiechert potential, field of moving point charge. **UNIT-6: RADIATION -** Dipole radiation, electric dipole radiation and magnetic dipole radiations: E and B radiated, Energy flux and power radiated, Radiation from an arbitrary source, power radiated by a point charge	10 08	Completed	

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K.C.E. Society's

MOOLJI JAITHA COLLEGE, JALGAON

TEACHING PLAN

Academic Year 2020 - 21

Name of Teacher: - Mr. P. G. JADHAV
Department: - Physical Science
Class: - S.Y.B.Sc. (Physical Science)
Title of Paper: - PRACTICALS

Faculty: - Science
Semester: - IV
Paper: - III
Paper Code: - PHY – 243

Month	Topic/s to be Covered	No of Lectures Required	Review (Complete / Incomplete)	Action plan if incomplete
April	1. To study Lissajous Figures and demonstration of Lissajous figures by using C.R.O. 2. Study of acoustic resonance by using bottle as a resonator. 3. Study of resonance using Kater's pendulum.	08	Completed	
May	1. Log decrement. 2. To determine the Resolving Power of a Prism. 3. To determine the value of Cauchy Constants of a material of a prism.	08	Completed	
June	1. To determine wavelength of sodium light using Newton's Rings. 2.To determine wavelength of (1) Sodium & (2) spectrum of Mercury light using plane diffraction Grating 3. To determine the Resolving Power of a Plane Diffraction Grating.	08	Completed	
July	1. Determination of specific rotation α of optically active substance using Polarimeter.	04	Completed	

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K.C.E. Society's

MOOLJI JAITHA COLLEGE, JALGAON

TEACHING PLAN

Academic Year 2020 -21

Name of Teacher: - Dr Pratibha R Nikam
Faculty: - Science
Department: - Physical Science
Semester: - I
Class: - S.Y.B Sc. (Physical Sciences)
Paper: - I
Title of Paper: - Thermodynamics
Paper Code: - PHY – 301

Month	Topic/s to be Covered	No of Lectures Required	Remarks
August	**Unit 1: Basics of thermodynamics and its First Law** Thermodynamic Description of system, Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, Various Thermodynamical Processes, Applications of First Law: General Relation between C_P and C_V, Work Done during Isothermal and Adiabatic Processes.	06	
September	Compressibility and Expansion Coefficient, Reversible and irreversible processes. **Unit 2: Second and Third Law of Thermodynamics and Entropy** Second law & Entropy, Carnot's cycle & theorem, Entropy changes in reversible and irreversible processes, Entropy-	02 04	
October	temperature diagrams, Third law of thermodynamics, Unattainability of absolute zero, Enthalphy **Unit III: Heat Engines:** Carnot's cycle, theorem & Carnot's Engine, Otto Engine and Cycle, Diesel Engine and Cycle, Efficiencies of all heat Engines.	04 03	
November	**DIWALI HOLIDAY (ONE WEEK)** **Unit IV: Kinetic Theory of Gases** Mean free path (Zeroth Order), Transport Phenomena: Viscosity, Conduction and Diffusion (for vertical case),	04	
December	Degrees of freedom, Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases. Degrees of freedom, Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases.	07	
January	**External Examinations**		

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MOOLJI JAITHA COLLEGE, JALGAON

TEACHING PLAN

Academic Year 2020 -21

Name of Teacher: - Dr Pratibha R Nikam | Faculty: - Science
Department: - Physical Science | Semester: - V: (SEC)
Class: - T.Y.B Sc. (Physical Sciences) | Paper: - V
Title of Paper: PHY 505: Solar energy and application

Month	Topic/s to be Covered	No of Lectures Required	Remarks
Aug	**Unit 1: Solar Radiation:** The Sun, structure of the sun, solar constant, spectral distribution of extra-terrestrial radiation, Solar radiation at the earth's surface (terrestrial radiation), solar time and equation of time, Definitions: air mass, beam radiation, diffuse radiation, global radiation, irradiance, solar insolation. Solar radiation geometry, Empirical equation (derivation not expected) for Monthly Average: 1) Daily global radiation, 2) Daily diffuse radiation, 3) Hourly global radiation, 4) Hourly diffuse radiation. Solar radiation on tilted surfaces. Instruments for measuring solar radiation: Pyranometer, Pyrheliometer.	08	
Sept	**Unit 2: Solar Collectors:** **Flat plate collector:** Types (Liquid flat-plate type, Evacuated Tube collector type, flat-plate with Alinsulator, Polymer solar collector), materials for collectors (Absorber plate, Insulation and Cover plate),Efficiency of flat plate collector, Loss coefficients and Heat transfer, Heat Removal Factor, Improvement in efficiency. **Solar Concentrating Collectors:** Flat plate collector with reflector, Cylindrical parabolic collector, Thermal analysis, Performance analysis.	10	
Oct	**Unit 3: Solar Photovoltaics:** A P-N junction, Energy level diagram of semiconductors, Fermi level in doped semiconductors, Photovoltaic principals, Materials for Solar cell, Single crystal silicon cell: Principle, construction, working, equivalent circuit, I-V characteristics of solar cell, Fill factor, Power-voltage characteristics of solar cell, Maximum conversion efficiency, Actual conversion efficiency, Limitations to cell efficiency, Multicrystalline silicon cell, Thin Film Solar Cell, Short circuit current, Open circuit voltage, Maximizing the performance, Cell size.	10	
Nov	**DIWALI HOLIDAY (ONE WEEK)** **Unit 4: Solar Thermal Applications**: Solar water heater: Direct natural circulation type, Direct forced circulation type, Design consideration of solar water heater, Series and Parallel Arrays, Solar drying of food (Direct type and Indirect mode type),Solar cooling and refrigeration, Solar thermal power generation, Solar furnace (Direct incident type).	10	
Dec	**Unit 5: Solar PV Applications:** **PV Systems:** Classification, Basic Photovoltaic power system, Stand-alone PV system, Solar Cell Modules (Solar PV arrays), Series and Parallel combination of PV Modules, Grid-connected system, Solar power satellite, Power conditioning and control. Design of PV System: Array size and Battery size. **Energy storage:** electro chemical batteries, large capacity approaches. **PV Applications:** Industrial applications, Social applications, Consumer applications.	08	
Jan	**UNIVERSITY EXAMINATION START**		

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MOOLJI JAITHA COLLEGE, JALGAON
TEACHING PLAN
Academic Year 2020 -21

Name of Teacher: - Dr Pratibha R Nikam
Department: - Physical Science
Class: - T.Y. B. Sc. (Physics)
Title of Paper: Physics Practical Course-III (Project-I)

Faculty: - Science
Semester: - V
Paper: - IX
Paper Code: -PHY-509

Month	Topic/s to be Covered	No of Lectures Required	Remarks
August	**Project Group Formation**	02	
September	Searching for Topics & Discussion	06	
October	Project Title Finalization	04	
November	Literature Collection & Reading/ Literature Survey	12	
December	Experimental Set-ups & Discussions	15	
January	**External University Exam**		

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MOOLJI JAITHA COLLEGE, JALGAON
TEACHING PLAN
Academic Year 2020-21

Name of Teacher: - Dr. Pratibha R Nikam
Faculty: - Science
Department: - Physical Science
Semester: - I (III)
Class: - S. Y. M.Sc. (Physical Science)
Paper: - III
Title of Paper: - Atomic and Molecular Physics
Paper Code: - PHY – 301

Month	Topic/s to be Covered	No of Lectures Required	Remarks
August	**Unit I: ATOMIC SPECTRA** Quantum states of an electron in an atom, Electron spin, Spectrum of hydrogen, Helium and alkali atom., Relativistic corrections for energy levels of hydrogen atom, Lande interval rule, inverted terms, Hund's rule, Zeeman effect, Paschen Back effect in complex spectra , Stark effect of hydrogen in weak and strong field, Hyperfine structure: Introduction, origin of hyperfine structure, hyperfine structure of two or more valence electrons, width of spectral line, LS and JJ coupling.	16	
September	**Unit II: MOLECULAR SPECTRA** Classification of molecular spectra, Types of molecules, Pure rotational spectra, relative intensities of spectral line, rotational spectra of rigid and non-rigid molecule through microwave spectroscopy, Determination of moment of intertia and bond length from rotational spectra. Harmonic oscillator, Unharmonic oscillator, rotational-vibrational spectrum (diatomic vibrating rotator).	14	
October	**Unit III: ELECTRONIC SPECTRA, RAMAN SPECTRA** Electronic Spectra: Electronic spectra of diatomic molecule, Born Oppenheimer approximation, Vibrational coarse structure of electronic band, Franck- Condon principle, selection rule, dissociation and pre dissociation. Raman Spectra: Raman effect, experimental arrangement of Raman Spectrometer, Quantum theory of Raman Spectra, Raman spectroscopy in the structure determination of simple molecule.	10	
November	**Unit IV: ESR , NMR:** [08 h] ESR-Electron spin resonance, ESR spectrometer and its application. NMR- Nuclear spin magnetic moment, interaction of nuclear magnet with external field, NMR spectrometer, chemical shift and its application.	08	
December	**Unit V: LASER:** [08 h] Spontaneous & Stimulated emission, Einstein A & B coefficient, optical pumping, population invertion, rate equation, mode of resonator and coherence length.	04	
January	**External Examination**		

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K.C.E. Society's

MOOLJI JAITHA COLLEGE, JALGAON
TEACHING PLAN
Academic Year 2020 -21

Name of Teacher: - Dr Pratibha R Nikam
Department: - Physical Science
Class: - S. Y. M. Sc. (Physics)
Title of Paper: Special laboratory III

Faculty: - Science
Semester: - I (III)
Paper: - III
Paper Code: -PHY-303

Month	Topic/s to be Covered	No of Lectures Required	Remarks
August			
September	Synthesis of thin film by chemical bath deposition (CBD) method. Deposition of thin film by using SILAR method	04 04	
October	Synthesis of nanoparticles using plant extract (Green synthesis method). Synthesis of metal nanoparticles. The Franck-Hertz experiment	04 04 04	
November	**DIWALI FESTIVAL HOLIDAY** Study of hysteresis of hard and soft ferrites. Determination of resonance frequency of piezoelectric element	 04 04	
December	Determination of Curie temperature of a given sample.	04	
January	**Session Exams/UNIVERSITY EXAMINATION START**		

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K.C.E. Society's

MOOLJI JAITHA COLLEGE, JALGAON
TEACHING PLAN
Academic Year 2020 -21

Name of Teacher: - Dr Pratibha R Nikam
Department: - Physical Science
Class: - S. Y. M. Sc. (Physics)
Title of Paper: Physics Project-I

Faculty: - Science
Semester: - I (III)
Paper: - IV
Paper Code: -PHY-304

Month	Topic/s to be Covered	No of Lectures Required	Remarks
August	**Project Group Formation**		
September	Searching for Topics & Discussion		
October	Project Title Finalization		
November	Literature Collection & Reading/ Literature Survey		
December	Discussions		
January	**External University Exam**		

H. O. D. **Principal** **Teacher**

K.C.E. Society's

MOOLJI JAITHA COLLEGE, JALGAON

TEACHING PLAN

Academic Year 2020-21

Name of Teacher: - Dr Pratibha R Nikam
Faculty: - Science
Department: - Physical Science
Semester: - II
Class: - S. Y. B. Sc. (Physical Sciences)
Paper: - IV
Title of Paper: Waves and oscillations
Paper Code: -PHY-241

Month	Topic/s to be Covered	No of Lectures Required	Remarks
March	**Unit I:** Different types of equilibria (stable, unstable, and neutral equilibrium), Definition of linear and angular S.H.M., Differential equation of S.H.M. and its solution (exponential form), Composition of two perpendicular linear S.H.Ms. for frequencies 1:1 and 1:2 (analytical method), Illustrative Numericals, Lissajous's figures and its uses, Applications (mechanical, electrical and optical).	07	
April	**Unit II:** Waves Motion General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Plane waves, Spherical waves, Wave intensity.	05	
May	**Unit III:** Forced oscillations and Resonance: Idea of forced oscillations, circuit Resonance and its types- Mechanical resonance (Barton's pendulum), Acoustic resonance (resonance tube), Electrical resonance (LCR circuit) and Optical resonance (sodium vapour lamp), Differential equation of forced oscillations and its solution, Amplitude of forced oscillations, Amplitude resonance, Application to series L-C-R.	08	
June	**Unit IV:** **Parameters of Sound**: Sound intensity, Loudness, Pitch, Quality and timber, Acoustic intensity level measurement, Acoustic pressure and its measurement. Reverberation and time of reverberation. Fourier's Theorem: Application to saw tooth wave and square wave **Ultrasonic:** Classification of sound frequencies, Piezoelectric effect, Generation of ultrasonic waves by piezoelectric oscillator (using transistor), Application of ultrasonic waves.	05	
July	**Unit V:** Doppler effect in sound, Expression for apparent frequency (no derivation), discussion of different cases when source, observer and medium are in relative motion, Asymmetric nature of Doppler effect in sound, Doppler effect in light, Symmetric nature of Doppler effect in light, Applications of Doppler effect in sound and light**.**	05	
August	External Examinations		

H. O. D. **Principal** **Teacher**

K.C.E. Society's

MOOLJI JAITHA COLLEGE, JALGAON
TEACHING PLAN
Academic Year 2020-21

Name of Teacher: - Dr. Pratibha R Nikam
Faculty: - Science
Department: - Physical Science
Semester: - VI
Class: - T.Y.B.Sc. (Physical Science)
Paper: - II
Title of Paper: -Material Science
Paper Code: - PHY-602

Month	Topic/s to be Covered	No of Lectures Required	Remarks
March	**Unit 1: Introduction to materials** Classification of materials, Advanced materials, Materials of the future (Smart materials and Nano Materials) Organic Materials (Polymers): Properties of polymer, Polymerization, Degree of polymerization, Linear polymers and their types, Vulcanization of rubber, Molecular weight, Molecular structure, Thermoplastic & Thermosetting Polymers. Advanced polymeric materials, Polymers additives. **Unit 2: Properties of Materials** Mechanical Properties: Stress, strain (tensile, compressive and shear), strength, elasticity,	10	
April	plasticity, ductility, malleability, hardness, toughness, creep, fatigue, stiffness, Isotropy, Anisotropy, factor affecting the mechanical properties, (Grain size, temperature, exposure to atmosphere, Heat treatment and Carbon content). Thermal Properties: Heat capacity, Thermal expansion, Thermal conductivity. Electrical Properties: Conductivity, resistivity, dielectric strength, piezoelectricity. **Unit 3: Atomic disorder in materials** Solid solution: Types of solid solution (Interstitial and substitutional solid solution), Rules of solid solubility.	08	
May	Imperfections (defects) in solids: (i) Point defects: vacancies, Frenkel defect, Schottky defect, (ii) Line defects (Dislocation): Edge dislocation, screw dislocation**,** (iii) Surface defects or interfacial defects and (iv) Volume defect. Plastic deformation: Mechanism by slip system.	07	
June	**Unit 4: Diffusion of solid material** Atomic diffusion- Definition, Mechanism (Interstitial, vacancy diffusion), self diffusion in nickel, diffusivity,Fick's first law of diffusion, Fick's second law of diffusion, variation of diffusivity with temperature, factor that influence diffusion.	04	
July	**Unit 5: Phase Diagram** Phase diagram, Phase equilibrium, Construction of phase diagram, Gibb's Phase rule, classification of phase diagram (Unary Phase diagram, Binary Phase Diagram), Binary Phase Diagram for: i) Sugar-Water, ii) NaCl-water, Construction of phase diagram, Eulectic reaction, lever rule, Pb-Sn phase diagram**.**	04	
August	External Examinations		

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K.C.E. Society's

MOOLJI JAITHA COLLEGE, JALGAON
TEACHING PLAN
Academic Year 2020-21

Name of Teacher: - Dr. Pratibha R Nikam
Department: - Physical Science
Class: - S. Y. M.Sc. (Physical Science)
Title of Paper: - Solar Power Plant: Design and Installation

Faculty: - Science
Semester: -IV
Paper: - III
Paper Code: - PHY – 405

Month	Topic/s to be Covered	No of Lectures Required	Remarks
March	**Unit I: The need of solar power:** Basics need of solar power and generation system, Types of Solar power system: Grid connected solar Power Plant, Grid interactive solar power plant, Net Metering Solar Power Plant, Off-Grid / Hybrid solar power plant, Schemes of solar power plant.	08	
April	**Unit II: Selection of PV module technology:** Introduction, Crystalline technology and Thin film technology: Mechanical equipment and its functioning, Comparison between PV module technologies, Comparison between solar power plant energy output.	12	
May	**Unit III: Plant Installation: Site survey and shadow analysis** Site survey, Design and evaluation of various parameters, tools involved in installation of system, PV module structure inter-row spacing calculation, Pitch analysis, Selection of PV module tilt angle, Near shading object calculation, Type of solar radiation, Sun path Diagram, Defining the Position of the Sun, Solar Altitude, Geometric Effects, Oriented Solar Modules.	12	
June	**Unit IV: Selection and Sizing of Inverters (Grid Connection and Off Grid) :** Types of solar inverter, Selection of inverter, Sizing of solar inverter for roof top and grid plants, Selection and sizing of string and central inverter, power conditioning unit (PCU), AC/DC overloading calculation and losses, Protection necessity of solar inverter, Types of Protection: Passive and active protection, Anti-islanding protection, Mounting arrangement of string inverter, Grid-Connected Inverters vs. Stand-Alone Inverters.	08	
July	**Unit V: Costing Of Solar Power Plant and Smart Grid/Net Metering:** Introduction, Life Cycle Costing, Determining Costs Associated with the Whole PV System, Valuing a PV System, Smart Grid, Smart Meters.	08	
August	**External Examination**		

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K.C.E. Society's
MOOLJI JAITHA COLLEGE, JALGAON

TEACHING PLAN
Academic Year 2020 -21

Name of Teacher: - Dr Pratibha R Nikam
Department: - Physical Science
Class: - S. Y. M. Sc. (Physics)
Title of Paper: Special laboratory III

Faculty: - Science
Semester: - I (III)
Paper: - III
Paper Code: -PHY-403

Month	Topic/s to be Covered	No of Lectures Required	Remarks
March	To determine diameter of a given wire by diffraction. Verification of Brewster's law of polarization using He-Ne laser To determine the wavelength of a LASER source using an engraved scale as a reflecting diffraction grating. To verify Heisenberg uncertainty principle using He-Ne laser source.	04 04 04 04	
April	Study of power vs. load characteristics of solar P.V. systems and study of series and parallel combination of solar P.V. panels. Measurement of external quantum efficiency of solar cell. Efficiency measurement of standalone SPV system. Dark and illuminated IV characteristics of solar cells	04 04 04 04	
May	Optical absorption of nanoparticles (observation of Blueshift with size of particles).	04	
June	Determination of grain size of a given sample by Scherer method. Determination of direct and indirect band gap of a given materials by UV-visible spectroscopy.	04 04	
July	To analyse the photoluminescence spectrum of a given sample. To analyse the Raman Spectrum of a sample.	04 04	
August	**External Examination**		

H. O. D. **Principal** **Teacher**

K.C.E. Society's
MOOLJI JAITHA COLLEGE, JALGAON

TEACHING PLAN
Academic Year 2020 -21

Name of Teacher: - Dr Pratibha R Nikam
Department: - Physical Science
Class: - T. Y. B. Sc. (Physics)
Title of Paper: Special laboratory III

Faculty: - Science
Semester: - VI
Paper: - IX
Paper Code: -PHY-609

Month	Topic/s to be Covered	No of Lectures Required	Remarks
March	Literature Collection & Reading/ Literature Survey	04 04 04 04	
April	Discussions	04 04 04 04 04	
May	Experimental and Result Analysis (Comparative Review)	04	
June	Compilation of Collected Data	04 04	
July	**Final Discussion & Report Preparation**	04 04	
August	**External Examination**		

H. O. D. **Principal** **Teacher**

K.C.E. Society's
MOOLJI JAITHA COLLEGE, JALGAON

TEACHING PLAN
Academic Year 2020 -21

Name of Teacher: - Dr Pratibha R Nikam
Department: - Physical Science
Class: - S. Y. M. Sc. (Physics)
Title of Paper: Physics Project-II

Faculty: - Science
Semester: - IV
Paper: - IV
Paper Code: -PHY-404

Month	Topic/s to be Covered	No of Lectures Required	Remarks
March	Literature Collection & Reading/ Literature Survey	04 04 04 04	
April	Discussions	04 04 04 04	
May	Experimental and Result Analysis (Comparative Review)	04	
June	Compilation of Collected Data	04 04	
July	**Final Discussion & Report Preparation**	04 04	
August	**External Examination**		

H. O. D. **Principal** **Teacher**

K.C.E. Society's
MOOLJI JAITHA COLLEGE, JALGAON

TEACHING PLAN
Academic Year 2020 -21

Name of Teacher: - Ms. B. A. MANEKAR **Faculty: - Science**
Department: - Physical Science **Semester: - III**
Class: - M. Sc. (Physical Sciences) **Paper: - VI**
Title of Paper: -Material Synthesis Method **Paper Code: -PHY- 306**

Month	Topic/s to be Covered	No. of Lectures Required	Remarks
August	**Unit I: Nucleation and growth of thin films:** Condensation, Langmuir-Frankel theory of condensation. Theories of nucleation: Capillarity model, Atomistic model, various stages of growth. **Unit II: Mechanical methods:** Introduction, High Energy Ball Milling, Melt Mixing, Spray- techniques, Spin techniques, Screen printing (Doctor blade method), Electroplating, Electroless plating, Electrolytic anodization. **Unit III: Thermal evaporation**: Resistance heating, Flash evaporation, R.F. heating, Electron beam (e-beam) heating, Molecular Beam Epitaxy(MBE), Cathodic sputtering- Sputtering process, glow discharge sputtering pressure, factor affecting sputtering,sputtering variants, Low pressures sputtering: Magnetic field, Assisted(triode)sputtering, R.F. sputtering, Ion-beam sputtering. Reactive sputtering. **Chemical Vapour Deposition Techniques:** Principle, chemical reactions used: Pyrolysis (Thermal decomposition), Hydrogen reduction, Halide disproportionation, Transfer reactions, polymerization.	**04** **04** **08**	
September	Types of CVD: Atmospheric-pressure CVD (APCVD), Low-pressure CVD (LPCVD), Metalorgainc CVD (MOCVD), Photo-enhanced CVD (PHCVD), Laser-induced CVD (PCVD), Electron-enhanced CVD. **Unit IV: Chemical methods:** Introduction, Synthesis of materials using colloidal route, chemical bath deposition, SILAR, Spray Pyrolysis, Langmuir-Blodgett (LB) Method, Microemulsions, Sol-Gel Method, Hydrothermal Synthesis, Sonochemical Synthesis, Microwave Synthesis, flux method. **Unit V: Biological methods:** Introduction, Synthesis Using Microorganisms, Synthesis Using Plant Extract, Use of Proteins, Templates Like DNA, S-Layers etc, Synthesis of Nanoparticles using DNA.	**04** **06**	

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TEACHING PLAN

K.C.E. Society's
MOOLJI JAITHA COLLEGE, JALGAON
TEACHING PLAN
Academic Year 2020 -21

Name of Teacher- Ms. B. A. MANEKAR **Faculty: - Science**
Department: - Physical Science **Semester: - I**
Class: - M. Sc. (Physical Sciences) **Paper: - VI**
Title of Paper: -Electronics **Paper Code: -PHY- 106**

Month	Topic/s to be Covered	No. of Lectures Required	Remarks
March	**Unit I:**Diodes, transistors, Field Effect Devices, homo and hetero-junction devices: device structure, device characteristics, frequency dependence and applications. Opto-electronic devices: solar cells, photo-detectors, LEDs **Unit II:** Transistor DC biasing circuits: DC load line, Q-point, base bias, voltage divider bias, Emitter bias Collector feedback bias, Emitter feedback bias: circuit analysis	**06** **03**	
April	Amplifier AC equivalent circuits: ac analysis of transistors, small signal analysis, H parameters. **Unit III:**Feedback: Positive and negative feedback and their effects, Oscillators: Introduction, Barkhausen criteria, Wien bridge, phase shift, Colpitt and Hartley. Amplifier properties: gain, input and output impedance, Class A, B and C amplifiers, power amplifiers **Unit IV**: Linear Op Amp Circuits, Non-Linear Op Amp Circuits, applications: integrator, differentiator, comparator, Schmidt trigger, active filters.	**03** **08** **03**	
May	**UNIT V:** Digital Electronics-Logic gates, Arithmetic circuits, Flip Flops, NAND & NOR gates as building blocks, X-OR Gate, simple combinational circuits, K-Map, Flip-flop, shift register, counters, Basic principles of A/D & D/A converters, Simple applications of A/D & D/A converters.	**08**	

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MOOLJI JAITHA COLLEGE, JALGAON

TEACHING PLAN

Academic Year 2020 -21

Name of Teacher: - Ms. B. A. MANEKAR **Faculty: - Science**

Department: - Physical Science **Semester: - I**

Class: -F.Y.B.Sc. (Physical Sciences) **Paper: - I**

Title of Paper: -Laboratory **Paper Code: -PHY- 113**

Month	Topic/s to be Covered	No. of Lectures Required	Remarks
March	1. Determination of Least count of various measuring instruments. 2. To determine the M.I. of disc using ring. 3.To determine Young's modulus 'Y' of the wire using flat spiral spring. 4. To determine the value of 'g' acceleration due to gravity and radius of gyration using bar pendulum**.**		
April	5. To determine Young's modulus 'Y' of rectangular beam by method of bending. 6. To determine modulus of rigidity 'η' by using flat spiral spring. 7. To determine modulus of rigidity 'η' by using torsional oscillations. 8. To determine Young's modulus 'Y' of rectangular beam by vibrational cantilever		
May	9. To determine the value of 'g' acceleration due to gravity with Kater's pendulum. 10. To determine Young's modulus 'Y' of elasticity of a given wire using Searle's apparatus.		

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MOOLJI JAITHA COLLEGE, JALGAON
TEACHING PLAN
Academic Year 2020 -21

Name of Teacher: - Ms. B. A. MANEKAR **Faculty: - Science**

Department: - Physical Science **Semester: - II**

Class: - F.Y. B.Sc. (Physical Sciences) **Paper: - I**

Title of Paper: -Electricity and Electrostatics **Paper Code: -PHY- 121**

Month	Topic/s to be Covered	No of Lectures Required	Remarks
June	**1.Vector Analysis:** Scalar and Vector product, gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume, integrals of Vector fields, Gauss-divergence theorem and Stokes's theorem of vectors.	**08**	
July	**2. Network theorems in current electricity:** Kirchhoff's laws and loop analysis by Kirchhoff's laws, Network theorems: Thevenin's theorem Norton's theorem with illustrations, Maximum power transfer theorem, Electric power, Electricity bill calculation, Joule's law.	**08**	
August	**3.Electrostatics:** Electrostatic Field, electric flux, Gauss's theorem of electrostatics, Applications of Gauss theorem- Electric field due to point charge,infinite line of charge, uniformly charged sphericalshell and Solidsphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential.	**12**	

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TEACHING PLAN
Academic Year 2020 -21

Name of Teacher: - Ms. B. A. MANEKAR **Faculty: - Science**
Department: - Physical Science **Semester: - II**
Class: - M. Sc. (Physical Sciences) **Paper: - VI**
Title of Paper: -Elements of Material Science **Paper Code: -PHY- 206**

Month	Topic/s to be Covered	No of Lectures Required	Remarks
June	**Unit 1: Classification of Materials** Classification of Engineering Materials, Selection of materials, Level of structure, Modern material needs, structure-property relationship in materials. **Unit2: Properties of Materials** Mechanical fundamentals, isotropy and anisotropy, stressand strain, h law and modulus of materials, Poisson's ratio, stress-strain relation All-important mechanical properties: factors affecting mechanical properties. Resistivity, conductivity, Ionic conductivity, Superconductivity,Insulators, Semiconductors, factors affecting conductivity. Melting point, Thermal Shock, Heat capacity, Specific heat, Thermal expansion and thermal conductivity, Electromagnetic radiation, refraction, reflection, absorption, transmission, magnetization, magnetic moments, dipoles, magnetic domain, types of magnetism, susceptibility and curie temperature, hysteresis loss, Ferrites.	**03** **07**	
July	**Unit 3: Phase Diagram** Single and multi-phase solids, solid solutions, factors governing the solid solubility (Hume Rother rules for primary solid solution), inter-metallic compounds, valency compounds, electron compounds, interstitial compounds.Phase rule, Unary and binary phase diagram, construction of phase diagram, Lever rule, interpretation of phase diagram, Isomorphous system, eutecticsystem, eutectoid system, peritectic system, micro structuraldiagramdevelopments: Study of Pb-Sn, Fe-C, Cu-Ni phase diagram. **Unit4: Metallurgical Thermodynamics and Phase Transformation** Thermodynamic origin of phase diagram, Crystal, grain and grain boundary, Solidification and crystallization,nucleation, nucleation rate, crystal growth, rate of crystal growth, surface energy, critical radius inheterogenous and homogenous nucleation, allotropic transformation.	**08** **04**	

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Academic Year 2020 -21

Name of Teacher: - Ms. B. A. MANEKAR **Faculty: - Science**
Department: - Physical Science **Semester: - III**
Class: - M. Sc. (Physical Sciences) **Paper: - VI**
Title of Paper: -Elements of Material Science **Paper Code: -PHY- 206**

Month	Topic/s to be Covered	No of Lecture Required	Remarks
July	**Unit5: Polymeric Materials** Basic concepts of polymer, size of polymer,mechanisms of polymerization, molecular weight, molecular shape, structure, configuration,crystallinity, mechanical, optical and thermal,electrical properties - conducting polymers	**04**	
August	**Unit 6: Ceramics** Classification of ceramics, structure of ceramics, silicate's structure, polymorphism of ceramics, mechanical, thermal and electrical properties of ceramic phases, clay and clay materials. **Unit7: Advanced Materials** a) **Nanomaterials:** Concept of nanomaterials, electron confinement in infinitelydeep square well, confinement in two and one dimensional well, idea ofquantum well structure, quantum dots, mechanical, electrical, thermal, magnetic and optical properties of nanomaterials. b) **Composite materials:** Concept of composite, Types of composite, agglomerated materials, reinforce material, Surface coating: Laminates, metallic coatings. c) **Materials for Solar energy:** Photovoltaic materials: Inorganic materials (Si, GaAs), Organic materials, perovskite, photothermal: selective coatings.	**04** **08**	

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MOOLJI JAITHA COLLEGE, JALGAON
TEACHING PLAN
Academic Year 2020 -21

Name of Teacher: - Ms. B. A. MANEKAR **Faculty: - Science**
Department: - Physical Science **Semester: - II**
Class: - F.Y. B. Sc. (Physical Sciences) **Paper: - II**
Title of Paper: -Laboratory **Paper Code: -PHY- 123**

Month	Practical to be taught	No of Lectures Required	Remarks
June	1. To use multimeter for measuring a) Resistor, b) A. C. and D. C. voltage, c) D. C. current 2. To determine the time constant of RC circuit by charging and discharging of capacitor through resistance 3. To verify experimentally Norton's 4. Thevenin's theorem	03	
July	5. Verification of Kirchhoff's law 6. To determine the time constant of a LR circuit. 7. To calculate the monthly electric bill using energy meter and compare the cost with theoretically calculated cost. 8. To determine the frequency of the A. C. mains using a vibrating wire and magnet.	04	
August	9. To verify maximum power theorem 10. To study the series LCR circuit and its a) Resonant Frequency b) Quality factor	02	

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MOOLJI JAITHA COLLEGE, JALGAON
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Academic Year 2020 -21

Name of Teacher: - Ms. B. A. MANEKAR **Faculty: - Science**
Department: - Physical Science **Semester: - II**
Class: - F.Y. B. Sc. (Physical Sciences) **Paper: - II**
Title of Paper: -Laboratory **Paper Code: -PHY- 243**

Month	Practical to be taught	No of Lectures Required	Remarks
March	dy of resonance using Kater's pendulum. 2. Study of acoustic resonance by using bottle as a resonator 3. To determine wavelength of sodium light using Newton's Rings. 4. Log decrement.	**04**	
April	5. To determine the Resolving Power of a Prism. 6. To determine the value of Cauchy Constants of a material of a prism. 7. To determine wavelength of (1) Sodium & (2) spectrum of Mercury light using plane diffraction Grating 8. Determination of specific rotation α of optically active substance using Polarimeter.	**04**	
May	9. To determine the Resolving Power of a Plane Diffraction Grating. 10. To determine the angle of prism	**02**	

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TEACHING PLAN

Academic Year 2020-2021

Name of Teacher:-Mrs. S. O. Sharma Faculty:- Science
Department:- Physical Science Semester: - I
Class:-M.Sc I (Physical Science) Paper: - I
Title of Paper:- METHODS FOR MATHEMATICAL PHYSICS Paper Code:- PHY – 101

Month	Topic/s to be Covered	No of Lectures Required	Remarks
February	**UNIT 1: VECTOR SPACES AND MATRICES** Definition of a linear vector space, Linear independence, basis and dimension, scalar product, inner product Orthonormal basis, Schwartz Inequality, Matrices, Orthogonal, Unitary, Eigen values and Eigen vectors of matrices, Matrix diagonalization, trace and normalization of matrix, Cayley-Hamilton theorem. **UNIT 2: SPECIAL FUNCTIONS** Definition of special functions, Generating functions for Bessel function of integral order Jn(x), Legendre polynomials Pn(x), Generating functions for Pn(x), Hermite Polynomials, Generating functions for Hermit polynomials.	18	
March	**UNIT 3: FOURIER SERIES** Fourier series: periodic function, Euler Fourier formula, Dirichilete conditions, half range Fourier series, Change of interval, Parseval‟s identity, Application of Fourier series-Vibrating string, RLC circuit and Square Wave. **UNIT 4: INTEGRAL TRANSFORMS** Integral transform, Laplace transform, Properties of Laplace transforms, Inverse Laplace Transform, Laplace transform of derivatives and integrals, Laplace‟s equation – application to electrostatic field. Fourier Transforms: Fourier sine and cosine transforms, odd and even functions, convolution theorem, Parseval‟stherom.	20	
April	**UNIT 5: ELEMENTS OF COMPLEX ANALYSIS** Introduction, Analytic functions, Cauchy-Riemann conditions, Harmonic functions, Cauchy‟s integral formula, Residue theorem, Residues atdifferent poles, Contour Integrals, Taylor and Laurent series, singularities, Definite integrals. **UNIT 6: ELEMENTARY PROBABILITY THEORY** A definition of the probability sample space, fundamental probability theorems, random variables, and probability distributions: binomial, Poisson, normal.	22	

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TEACHING PLAN

Academic Year 2020 -2021

Name of Teacher:-Mrs. S. O. Sharma | Faculty:- Science
Department:- Physical Science | Semester: - II
Class:-M.Sc I (Physical Science) | Paper: - II
Title of Paper:- STATISTICAL MECHANICS | Paper Code:- PHY – 202

Month	Topic/s to be Covered	No of Lectures Required	Remarks
June	UNIT 1: LAWS OF THERMODYNAMICS Necessity of Statistical Mechanics The laws of thermodynamics and their consequences, phase space, Statistical description of system of particles: state of a system, microstates, ensembles, basic postulates UNIT 2: STATISTICAL DESCRIPTION OF SYSTEM OF PARTICLES & STATISTICAL THERMODYNAMICS Behaviour of density of states, density of states for ideal gas in classical limit, thermal and mechanical interactions, quasi-static process Statistical thermodynamics:	20	
July	UNIT 2: Irreversibility and attainment of equilibrium, Reversible and irreversible processes, thermal interaction between macroscopic systems, approach to thermal equilibrium, dependence of DoS on external parameters, Statistical calculation of thermodynamic variables UNIT 3: CLASSICAL STATISTICAL MECHANICS Microcanonical ensemble and their equivalence, canonical and grand canonical ensembles, partition function, thermodynamic variables in terms of partition and grand partition functions, ideal gas, Gibbs paradox, validity of classical approximation, equipartition theorem, MB Velocity and speed distribution, Chemical potential, Free energy and connection withthermodynamicvariables	20	
August	UNIT 4: FORMULATION OF QUANTUM STATISTICS Formulation of quantum statistics, ensembles in quantum statistical mechanics, The theory of simple gases: Maxwell Boltzmann, Bose-Einstein, Fermi-Dirac gases, Statistics of occupation numbers, Evaluation of partition functions, Ideal gases in the classical limit UNIT 5: Ideal Bose system: Thermodynamic behaviour of an ideal Bose gas, Bose-Einstein condensation Thermodynamics of Black-bodyradiation, Stefan-Boltzmann law, Wien‟s displacement law, Specific heat of solids (Einstein and Debye models) Ideal Fermi systems: Thermodynamic behavior of an ideal Fermi gas, degenerate Fermi gas, Fermi Energy and mean energy, Fermi Temperature, Fermi velocity of a particle of a degenerate gas	20	

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TEACHING PLAN

Academic Year 2020 -2021

Name of Teacher:-Mrs. S. O. Sharma
Faculty:- Science
Department:- Physical Science
Semester: - II
Class:-M.Sc I (Physical Science)
Paper: - II
Title of Paper:-Laser and it's Applications
Paper Code:- PHY – 402

Month	Topic/s to be Covered	No of Lectures Required	Remarks
June	**Unit I: Introduction to Lasers and its characteristics**: Ordinary light and Lasers, Brief history of Lasers, Energy levels, Population inversion, Population density, Boltzmann distribution, Transition Lifetimes, Allowed and Forbidden Transitions, Stimulated Absorption, Spontaneous Emission and Stimulated Emission, Einstein‟s Coefficients, Einstein‟s relations. Directionality, Monochromaticity, Coherence, Brightness **Unit II: Laser Action:** Condition for large stimulated emission, Population inversion Condition for light amplification	20	
July	**Unit II: Laser Action:** Gain coefficient Active medium, Metastable states Pumping schemes: three level and four level **Unit III: Laser Oscillator**: Optical feedback, round trip gain, threshold gain, critical population inversion, Optical resonator, condition for steady state oscillations, cavity resonance frequencies. **Unit IV: Laser Output:** Line shape broadening, Lifetime broadening, Collision broadening, Doppler broadening.	18	
August	**Unit V: Types of Lasers:** Solid State Lasers – Ruby Laser, Diode Laser Gas Lasers – HeNe Laser, CO2 Laser, Liquid Lasers: Tunable dye laser Unit VI: Applications of Lasers: **Unit VI:Application of Laser**Industrial applications – welding, cutting, drilling: Nuclear Science applications – laser isotope separation, laser fusion, Defense - range finder Medical applications - eye surgery Optical applications - holography, supermarket scanners, compact discs.	22	

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TEACHING PLAN

ACADEMICYEAR: **2020-2021** NAME OF TEACHER: **Dr. V.D.Bharud**

FACULTY:**Science** DEPARTMENT: **Physics**

CLASS: **T.Y.B.Sc** SUBJECT: **Physics**

PAPER CODE and TITLE OF PAPER: PHY-501: **Mathematical Physics**

FIRST TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
August	**Unit 1: Vector Analysis** Gauss divergence theorem, Stokes' theorem, Green's first and second theorem, Green's theorem in the plane. (Statements, proofs and problems)	08	
September	**Unit 2: Differential Equation** Introduction to Cartesian (X, Y, Z), Spherical polar (r, θ, φ) and Cylindrical (ρ, φ, z) co-ordinate systems and their transformation equations, Degree, order, linearity and homogeneity of partial differential equation, Method of separation of variables in Cartesian, Spherical polar and Cylindrical co-ordinate system (Wave equation and Laplace's equation),	10	
October	**Unit 2 : Differential Equation** Singular points, Singular points of Legendre and Hermite differential equation, Statement of Fuche's theorem, Frobenius method of series solution, series solution of linear simple harmonic oscillator and Legendre differential equation . Generating functions for Legendre Polynomial $P_n(x)$, Hermite polynomial $H_n(x)$,and Bessel functions of first kind $J_n(x)$. Proof of following properties 1) $(n+1)\,P_{n+1}(x) = (2n+1)\,x\,P_n(x) - n\,P_{n-1}(x)$. 2) $P_n(x) = P'_{n+1}(x) - 2x\,P'_n(x) + P'_{n-1}(x)$.	13	
November	**Unit 3: Special Functions** 3) $H_{n+1}(x) = 2\,x\,H_n(x) - 2n\,H_{n-1}(x)$. 4) $H'_n(x) = 2n\,H_{n-1}(x)$. 5) $J_{n+1}(x) + J_{n-1}(x) = 2n / x\,J_n(x)$. 6) $J_{n-1}(x) - J_{n+1}(x) = 2\,J'_n(x)$ **Unit 4: Complex Analysis** Complex numbers and their graphical representation, Argand diagram, Conjugate of a complex number, Basic mathematical operations with complex numbers, Euler's formula,	10	
December	**Unit 4: Complex Analysis** De-Moivre's theorem, Roots of complex numbers, Functions of complex variables, Analyticity and Cauchy - Riemann conditions, Singular functions, Examples **Unit 5: Special Theory of Relativity** Newtonian relativity, absolute space, Galilean transformations, Michelson-Morley experiment,	15	
January	**Unit 5: Special Theory of Relativity** Postulatesof special theory of relativity, Lorent'z transformation equations, Length contraction, time dilation, relativity of simultaneity, variation of mass with velocity, addition of velocities, mass-energy relation, energy momentum relation.	10	

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TEACHING PLAN

ACADEMICYEAR: **2020-2021** NAME OF TEACHER: **Dr.V. D. Bharud**

FACULTY: **Science** DEPARTMENT: **Physics**

CLASS: **M.Sc-I** SUBJECT: **Physics**

PAPER CODE and TITLE OF PAPER: **PHY-302 :Quantum Mechanics-II**

THIRD TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
August	**Unit I: Approximation Methods for Stationary States:** Introduction, Time-Independent Perturbation Theory, Nondegenerate Perturbation Theory, Degenerate Perturbation Theory, Fine Structure and the Anomalous Zeeman Effect, The Variational Method, The Wentzel–Kramers–Brillouin Method,	14	
September	**Unit I: Approximation Methods for Stationary States:** General Formalism, Bound States for Potential Wells with No Rigid Walls, Bound States for Potential Wells with One Rigid Wall, Bound States for Potential Wells with Two Rigid Walls, Tunneling through a Potential Barrier	15	
October	**Unit II: Time-Dependent Perturbation Theory:** Introduction, The Pictures of Quantum Mechanics, The Schrödinger Picture, The Heisenberg Picture, The Interaction Picture, Time-Dependent Perturbation Theory, Transition Probability,	12	
November	Transition Probability for a Constant Perturbation, Transition Probability for a Harmonic Perturbation, Adiabatic and Sudden Approximations, Adiabatic Approximation, Sudden Approximation,	10	
December	Interaction of Atoms with Radiation, Classical Treatment of the Incident Radiation, Quantization of the Electromagnetic Field, Transition Rates for Absorption and Emission of Radiation, Transition Rates within the Dipole Approximation, The Electric Dipole Selection Rules, Spontaneous Emission	16	
January	**Unit III: Scattering theory:** [15 h] Scattering and Cross Section, Connecting the Angles in the Lab and CM frames, Connecting the Lab and CM Cross Sections, Scattering Amplitude of Spinless Particles, Scattering Amplitude and Differential Cross Section, Scattering Amplitude, The Born Approximation, The First Born Approximation, Validity of the First Born Approximation, Partial Wave Analysis, Partial Wave Analysis for Elastic Scattering, Partial Wave Analysis for Inelastic Scattering, Scattering of Identical Particles	12	

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TEACHING PLAN

ACADEMICYEAR: **2020-2021** NAME OF TEACHER: **Dr.V. D. Bharud**

FACULTY: **Science** DEPARTMENT: **Physics**

CLASS: **T Y B.Sc** SUBJECT: **Physics**

PAPER CODE and TITLE OF PAPER: **PHY 604: Modern and Applied Physics**

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
August	**Unit 1: Plank's Quantum theory:** Planck's quantum theory, properties of photon, Planck's constant and light as a collection of photons; photo-electric effect and Compton effect, Experimental verification of Compton's effect. **Unit 2: Bohr's and Sommerfield theories of hydrogen atom** Introduction of atomic spectra, Inadequacy of classical planetary model of hydrogen atom, Bohr's theory of hydrogen atom, Extension of Bohr's theory, Experimental verification of discrete atomic energy levels, correspondence principle, Bohr's Sommerfield model and relativistic effects, Limitations of quantum mechanical model.	14	
September	**Unit 3: Matter Waves (Foundation of Quantum mechanics)** Need of quantum mechanics, Wave particle duality of matter, de-Broglie hypothesis, Expression for matter waves, Electron diffraction ,Davission and Germer experiment, concept of wave group , phase velocity, group velocity, particle velocity and relations between them, Uncertainty principle, Thought experiment (Gamma ray microscope), different forms of uncertainty principle, applications of uncertainty principle (Non existence of electron in nucleus, determination of ground state of electron and size of hydrogen atom).	15	
October	**Unit 4: Fiber Optics** Introduction, construction of optical fiber, principle of operation, concept of acceptance angle, numerical aperture, attenuation in optical fiber and attenuation limit, preparation of optical fiber, optical fiber materials, types of optical fiber Single mode and multimode fibers, advantages and disadvantage of optical fiber, communication, Applications of fiber optics, Detail discussions on following applications: Temperature sensor, displacement sensor, fiber optic endoscopy, fiber optic communications.	12	
November	**Unit 5: Holography and its application** Concept of monochromatic and coherent source, basic idea of hologram, construction and re-construction hologram, types of hologram (list only), application of holography in microscopy and character recognition. **Unit 6: Introduction to bioelectricity** Electricity observed in living systems, examples and origin of bioelectricity, sodium and potassium transport, Nernst equation, resting and action potential, conduction velocity.	10	

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TEACHING PLAN

ACADEMICYEAR: **2020-2021** NAME OF TEACHER: **Dr.V. D. Bharud**

FACULTY: **Science** DEPARTMENT: **Physics**

CLASS: **M.Sc-II** SUBJECT: **Physics**

PAPER CODE and TITLE OF PAPER: **PHY-401: Nuclear Physics**

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
March	**UNIT 1: General properties of nuclei, Radioactive decay and Radiation detectors:** Nuclear mass, mass defect, binding energy, nuclear radius, angular momentum, magnetic dipole moment and electric quadrupole moment. Basic theory of Alpha, Beta and Gamma-Rays decay. Radioactivity and units of radiation. Interactions of charged particles and gamma-rays with matter. Basic working principle of radiation detectors with details of proportional counter, NaI(Tl) and semiconductor detectors	15	
April	**UNIT 2: Nature of Nuclear Interactions and Nuclear Reactions:** Nature and properties of nuclear force. Deuteron problem, Electromagnetic, weak and hadronic interactions. Low energy n-p and n-n scattering, Phase shift and scattering cross section. Q-value and threshold energy of nuclear reactions. Neutron and charged particle induced nuclear reactions, cross section of a nuclear reaction. Compound nucleus formation, nuclear fission and fusion reactions	15	
May	**UNIT 3: Nuclear Models and Nuclear Reactors:** Liquid drop model and Empirical mass formula. Shell Model with details of Magic numbers, Nuclear Energy levels and their applications. Collective Model. Nuclear fission and fusion reactions. Fissile and fissionable nuclei. Classification of nuclear reactors and electric power delivered Accelerator facility available in India: Van-de Graaff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons	15	
June	**UNIT 4: Elementary Particle Physics:** Classification of elementary particles, their masses, spin parity, and life-time. Additive quantum numbers such as strangeness, isospin, baryon number,hypercharge,etc. Classification of quarks, their masses and spins. Quark contents of particles. C.T.P invariances. Parity non conservation in weak interactions, etc. Gell-Mann-Nishijima formula.	15	

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TEACHING PLAN

ACADEMICYEAR: **2020-2021** NAME OF TEACHER: **Dr.V. D. Bharud**

FACULTY: **Science** DEPARTMENT: **Physics**

CLASS: **M.Sc-I** SUBJECT: **Physics**

PAPER CODE and TITLE OF PAPER: **PHY-203: SOLID STATE PHYSICS**

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
June	UNIT 4: DIELECTRIC AND OPTICAL PROPERTIES OF INSULATORS (Lectures: 12) Static fields: Macroscopic description of the static dielectric constant, The static electronic and ionic polarizabilities of molecules, Oriental polarization, The internal field according to Lorentz and the Clausius-Mosotti formula. Alternating fields: The complex dielectric constant and dielectric losses, dielectric losses and relaxation time, The Classical theory of electronic polarization and optical absorption. Ferroelectricity: General properties of ferroelectric materials, classification, ferroelectric domains.	15	
July	UNIT 5: MAGNETISM (Lectures: 12) Magnetic materials and their properties, Quantum theory of paramagnetism, Diamagnetism, Ferromagnetism: The Weiss molecular field and its interpretation, Temperature dependence of spontaneous magnetization.Antiferromagnetism: Molecular field theory, two sub lattice model.	15	
August	UNIT 6: SUPERCONDUCTIVITY (Lectures: 12) Introduction, Meissner effect, the critical field, Thermodynamics of superconducting transition: The heat capacity and stability of superconducting state, Electrodynamics of superconductors: The London equation, coherence length and penetration depth, BCS theory of superconductivity, the condensate, The Josephson Tunneling: DC and AC effect, Introduction to high Temperature superconductivity	15	

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TEACHING PLAN

ACADEMIC YEAR: 2020-21 NAME OF TEACHER: M.N.Lidhure

FACULTY: Science DEPARTMENT: Physics & Electronics

CLASS: S.Y.BSc SUBJECT: Microprocessor 8085

PAPER CODE and TITLE OF PAPER: ELE-232 Microprocessor 8085

FIRST TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARK
August	Admission process		
August	**Unit I:** Fundamentals of Microcomputer: Simple Microcomputer Architecture, Input/output Devices, Address bus, Data bus, Control bus, Data storage (idea of RAM and ROM). Computer memory, Memory Interfacing, Memory Map. High level language, Low level language, Assembler, Compiler	06	
September	**Unit II**: Architecture of 8085 Microprocessor: Features of 8085, Block diagram, function of each block, Registers, ALU, Stack Pointer, Program counter, instruction decoder & machine cycle encoder, Timing & control unit, Concept of Interrupt, Hardware/software interrupts, serial communication control, Pin-out diagram of 8085, function of each pin, Data and address buses,	08	
October	De-multiplexing the Bus AD7-AD0, Timing states (T-state), Machine Cycle, Instruction cycle. Timing diagram for Read and write operation (MOV A,M and MOV M,A) , Concept of Stack . Unit III: Instruction set of 8085 Microprocessor: Study of addressing mode for 8085:-Implied Addressing, Register Addressing, Immediate Addressing, Direct Addressing, Register Indirect Addressing	04 04	
November	Instruction set: Data transfer instructions, Arithmetic Instructions, Logical Instructions, Branching Instructions, Stack, I/O and Machine Control Instructions **Unit IV:** Assembly Language Programming: Assembly Language Format, Arithmetic Programs: - 8-bit addition, 8-bit subtraction, Decimal addition and subtraction of two 8-bit numbers, 8-multiplication, one's and two's complement of 16-bit numbers, find largest and smallest Number from a series of given number. Code Conversion Programs: Hex to ASCII conversion, BCD to binary conversion	04 04	

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TEACHING PLAN

ACADEMIC YEAR: 2020-21 NAME OF TEACHER: M.N.Lidhure

FACULTY: Science DEPARTMENT: Physics & Electronics

CLASS: T.Y.BSc SUBJECT: Advanced Microprocessor

PAPER CODE and TITLE OF PAPER: ELE 503 Advanced Microprocessor

FIRST TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARK
August	Admission process		
August	**The Processor 8086** Register organization of 8086, Architecture, Pin diagram and its functions, Signal Descriptions of 8086, Physical memory organization, General bus operation, I/O addressing Capability, activities, concept of stack. Minimum and Maximum mode 8086, System Bus Timing	08	
Septem ber	**8086 Instruction Set** Machine language instruction formats, Addressing mode of 8086, Instruction set of 8086:- Data Copy / Transfer Instructions, Arithmetic and Logical Instructions, Branch Instructions, Loop Instructions, Machine control Instructions, Flag Manipulation Instructions, Shift and Rotate Instructions, String Instructions	08	
October	**Assembler Directives and Operator** Data Definition and Storage Allocation, Structures, Records, Assigning Names to Expressions, Segment Definition, Program Termination, Alignment Directives, Value-Returning Attribute Operators	08	
Novem ber	**Programming of 8086** Simple assembly language program, Loop program and String processing program. **Intel 80386 & Pentium Operators** Key features of Intel 80386 – internal architecture of 80386 - operating modes - paging mechanism, Pentium processor – its features	04 04	

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TEACHING PLAN

ACADEMIC YEAR: 2020-21

NAME OF TEACHER: M.N.Lidhure

FACULTY: Science DEPARTMENT: Physics & Electronics

CLASS: **T.Y.BSc** SUBJECT: Electronics

PAPER CODE and TITLE OF PAPER: ELE 603: Microprocessor Interfacing Techniques

SECOND TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
November	Special Architectural Features and Related Programming : Interrupts and interrupt service routines, interrupt cycle of 8086, NMI and maskable Interrupt, interrupt Programming, Macros	8	
December	. Programming using Dos Interrupt: INT 21H (Function 01H, 02H, 09H, 4CH, 10H). I/O Programming and Interfacing Fundamental I/O Considerations, Programmed I/O, Interrupt I/O, Interfacing in I/O, Mapped I/O, Interfacing in Memory Mapped I/O	8	
January	DMA Controller IC 8257- its features, block diagram and interfacing with 8086 Basic & Special Programmable Peripheral devices and their Interfacing Block diagram of ADC -0808 and its interfacing, DAC 0800 interfacing,	8	
February	Stepper motor interfacing. Programmable Interval Timer 8253 – Internal block diagram, operating mode of 8253 Communication Interface Peripheral Serial communication interface	8	
March	Asynchronous and synchronous communication, Parallel communication interface, Programmable communication interface 8251- Internal Architecture and operating modes	8	

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TEACHING PLAN

ACADEMIC YEAR: 2020-21

NAME OF TEACHER: M.N.Lidhure

FACULTY: Science DEPARTMENT: Physics & Electronics

CLASS: **S.Y.BSc** SUBJECT: Electronics

PAPER CODE and TITLE OF PAPER: ELE-241: Digital Communication

SECOND TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
November	Basics of Digital Communication Block diagram of Digital communication system, Communication channel types and their characteristics (bit rate, bandwidth, repeater distance), Chanel modelling, Channel noise and its effect, Comparison of analog and digital communication system, Advantages and disadvantages of digital communication	6	
December	Digital Communication Techniques: Digital Transmission of Data, Pulse Code Modulation, Parallel and Serial, Digital Signal Transmission, Processing, Data Conversion, Introduction to MODEMs: FSK-modem, PSK-modem and DPSK-modem	8	
January	Introduction to Networking and Internet Technologies: Network Fundamentals, LAN Hardware, Ethernet LANs, Token-Ring LAN. Internet Applications, Storage-Area Networks, Internet Transmission Systems, Internet Security	06	
February	Satellite Communication: Satellite Orbits, Ground Stations, Satellite Communication system, Satellite Applications, Global Positioning, Satellite Subsystems Transponders and their types	05	
March	Cell Phone Technologies: Cellular Telephone Systems, Advanced Mobile Phone System (AMPS), Digital Cell Phone System.	05	

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TEACHING PLAN

ACADEMICYEAR: 2020-21

NAME OF TEACHER: Ms. Kavita Prakash Patil

FACULTY: Science DEPARTMENT: Physics/Electronics

CLASS: T.Y.B.Sc. SUBJECT: Electronics

PAPER CODE and TITLE OF PAPER: ELE506(A) Embedded C

FIRST TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
August	**Unit 1: Fundamentals of Embedded C** What is an Embedded System? Programming Embedded Systems. Factors for Selecting the Programming Language. Difference in C and Embedded C. Basic Structure of an Embedded C Program (Template for Embedded C Program). Different Components of an Embedded C Program. Examples of Basic Embedded C Program.	06	
September	**Unit 2: Introduction of Embedded C** Keywords and Identifiers, Constant, Variables. Data Types: Primitive, derived and User defined. Declaration of variables. Assigning values to variables. Storage Classes: External, Global, Static, Auto. Operators: Arithmetic operator, Relational operator, Logical operator, Assignment operator, Increment-decrement operator, Conditional operator, Ternary operator, Bitwise operator, Special operators. Operator precedence and Associativity. I\O statements: Reading and writing a single character, Standard and Formatted Input and Output statements, Preprocessor Directives (#define, #include, etc), Simple programming exercises	11	
October	**Unit 3: Decision Making, Branching and Looping** Statements – if, if-else, Nested if-else, else-if Ladder, switch, break, continue, goto. Entry and Exit controlled loops: while loop, do-while loop, for loop. Difference in while and do-while loop, Features of for loops, Nesting of for loops, Simple programming exercises. **Unit 4: Arrays and Character strings** One-dimensional array – Declaration and Initialization, Traversing of array.	11	
November	Two-dimensional array – Declaration and Initialization, Traversing of array. String – Declaring and Initializing string. Reading strings from terminal. Writing strings to screen. String Operations: copy, length, compare, search, manipulate. Simple programming exercises **Unit 5:User Defined Functions** Need of functions, Form of functions, Calling function, Function returning value, Category of Functions, Recursion, Simple programming exercises **Unit 6: Real World Interfacing using Embedded C**	11	

	Programming Introduction. Interface: LED, DC motor		
December	stepper motor, LCD, 7-seg. display, Matrix keyboard, temperature sensor, ADC and DAC.	06	

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TEACHING PLAN

ACADEMICYEAR: 2020-21

NAME OF TEACHER: Ms. Kavita Prakash Patil

FACULTY: Science DEPARTMENT: Physics/Electronics

CLASS: S.Y.B.Sc. SUBJECT: Electronics

PAPER CODE and TITLE OF PAPER: ELE-231: ANALOG COMMUNICATION

FIRST TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
August	**Unit 1: Basics of Electronics communication:** Significance of human communication, Communication system, Types of electronics communication, Types of Signals-Analog signal, Digital signal & base band signal	02	
September	Brief idea of frequency allocation for radio communication system in India (TRAI). Electromagnetic communication spectrum, band designations and usage, Concept of Noise, signal-to-noise(S/N) ratio **Unit 2: Amplitude Modulation and Transmission:** Basics of modulation, Need of modulation, Types: Amplitude Modulation (AM), Angle modulation (Frequency and Phase Modulation), Amplitude Modulation: Graphical representation of AM,AM analysis and its meaning, Modulation index, frequency spectrum, power relations, Concept of side bands(DSB-SC, SSB-TC, SSB-SC,VSB) modulation, Transistorized AM Modulator(Emitter modulator), PIN diode modulator, Advantages, disadvantages and applications of AM, Block diagram of AM Transmitter and its operation.	08	
October	AM Super heterodyne receiver- Block diagram and it's working with waveforms, Demodulation- AM Diode detector. Examples on modulation index and power relations in AM **Unit 3: Frequency Modulation:** Frequency Modulation (FM)- Graphical representation of FM, modulation index, CS, frequency deviation and frequency spectrum, equivalence between FM and PM, Comparison of AM and FM, Advantages, disadvantages and applications of FM, Generation of FM using VCO.	08	

November	FM detector: Foster Seeley Discriminator with phasor diagrams. Examples on modulation index, CS and frequency deviation **Unit 4:** **Analog Pulse Modulation:** Introduction, Need and Advantages of pulse Modulation, Types of pulse modulations, Principles of PAM generation, PWM generation and PPM generation.	08	
December	Brief idea about demodulation of PAM, PWM and PPM, Multiplexing: introduction to FDM and TDM Revision	04	

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TEACHING PLAN

ACADEMICYEAR: 2020-21

NAME OF TEACHER: Ms. Kavita Prakash Patil

FACULTY: Science DEPARTMENT: Physics/Electronics

CLASS: M.Sc-II SUBJECT: Physics

PAPER CODE and TITLE OF PAPER: PHY-305: Computational Methods and Programming Using 'C' Language

FIRST TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
August	**Iterative methods to obtain roots of equations**: The method of successive Bisection, False position method, Newton-Raphson method. Derivation of formula and advantages, as well as limitations of these methods over each other.	08	
September	**Interpolation:** Definition of Interpolation and extrapolation, finite differences, Interpolation with equally spaced and unevenly spaced points. Lagranges interpolation, curve fitting, polynomial least squares and cubic spline fitting.	08	
October	**Numerical Integration:** Derivation and application of Trapezoidal, Simpson 1/3 and Simpson's 3/8 th rule.	08	
November	**Solution of simultaneous linear equations:** Gauss elimination method, pivotal condensation, Gauss Seidal method.	08	
December	**Solution of first order differential equation:** Eulers method, Runge-Kutta methods.	08	

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TEACHING PLAN

ACADEMICYEAR: 2020-21

NAME OF TEACHER: Ms. Kavita Prakash Patil

FACULTY: Science DEPARTMENT: Physics/Electronics

CLASS: T.Y.B.Sc. SUBJECT: Electronics

PAPER CODE and TITLE OF PAPER: ELE 605: Embedded Systems

SECOND TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
March	**Unit 1: Introduction to Embedded System:** Introduction to Embedded Systems, Stand-alone and real-time embedded systems. Requirements of embedded systems, Components of embedded system. Programming languages and tools. Embedded operating system. Embedded system Application examples **Unit 2: Timer and Counter Programming** Single bit Programming, Timer modes, Programming the timers in various modes (Mode 1 and Mode2),	12	
April	Counter Programming. To generate delay of milliseconds & square wave. **Unit 3: Serial Port Programming** Basic of serial communication (Serial Vs Parallel data Transfer, Simplex, Duplex), Serial port of 8051, Baud rate in 8051, Programming the 8051 to transfer and to receive data serially, Importance of TI and RI flags, Baud rate doubling. **Unit 4: Interrupts Programming** Interrupts in 8051, enabling and disabling the interrupts,	14	
May	Programming timer interrupts, Programming external hardware interrupts, Level and edge triggered interrupts. **Unit 5: 8051 Interfacing** Interfacing of 8255 to 8051 & programming Introduction, Interfacing-keyboard (matrix), Displays (seven segment & LCD), Stepper motor, ADC, DAC (Sine wave & Square wave), Temperature Sensor (LM 35). Analog Comparator, Serial Peripheral Interface (SPI), Two Wire Interface (TWI) / I2C bus	14	

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TEACHING PLAN

ACADEMICYEAR: 2020-21

NAME OF TEACHER: Ms. Kavita Prakash Patil

FACULTY: Science DEPARTMENT: Physics/Electronics

CLASS: S.Y.B.Sc. SUBJECT: Electronics

PAPER CODE and TITLE OF PAPER: ELE 242: 8051 Microcontroller

SECOND TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
March	**Unit 1: Introduction to Microcontroller:** Block diagram of microcontroller, Advantages of microcontroller, Comparison between microprocessor and microcontroller, Applications of microcontroller (list only) **Unit 2: Architecture of 8051 Microcontroller:** 8051 microcontroller – Features, Block diagram, Pin out diagram, CPU registers, Flags and Program Status Word, Program Counter, Data Pointer, Special Function Registers& their Format, Stack& Stack Pointer, Internal RAM /ROM, Oscillator & Clock, Concept External Memory, Ports-0,1,2 & 3,	10	
April	Counter and Timers, Serial data input/ output transfers, Interrupts. **Unit 3: Addressing Modes and Instructions:** Addressing modes, Data Transfer Instructions, Arithmetic Instructions, Logical Instructions, Jump Instruction, Loop Instructions, Call and Return Instruction Boolean or Bit manipulation Instructions. **Unit 4: 8051 Microcontrollers Programming:** Assembly language programming- Arithmetic programming	10	
May	Code Conversion Programming (packed BCD to ASCII conversion, Binary to ASCII conversion). Timer Programming: steps of programming, characteristics of mode1and mode2, program (to generate square wave of a given frequency), I/O port Programming (generate 50% duty cycle square wave on port, toggle the port bits for every second) **Unit 5: 8051 Interfacing:** Interfacing of LED, Switch, Seven Segment Displays and Stepper Motor	10	

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TEACHING PLAN

ACADEMICYEAR: 2020-21

NAME OF TEACHER: Ms. Kavita Prakash Patil

FACULTY: Science DEPARTMENT: Physics/Electronics

CLASS: S.Y.B.Sc. SUBJECT: Electronics

PAPER CODE and TITLE OF PAPER: ELE 240: 8051 Microcontroller

SECOND TERM

MONTH	THEORY / PRACTICALS TO BE COVERED	NO.OF LECTURES REQUIRED	REMARKS
March	**Unit 1: Introduction to open loop and feedback control systems with examples, Motors:** Types, working principle, characteristic, and mathematical model of following: Motors AC/DC motors, Brushless DC motors, stepper, servo, linear, Synchronous, Generators, and Alternator Types, working principle, characteristics **Unit 2: Symbolic representation of following: Switches:** Toggle, Slide, DIP, Rotary, Thumbwheel, Selector, Limit, Proximity, Combinational switches, zero speed, belt sway,	10	
April	pull cord. Relays: Electromechanical, Solid state relays, relay packages Contactors: Comparison between relay & contactor, contactor size and ratings Timers: On Delay, off delay and Retentive **Unit 3: Sequencing & Interlocking for motors:** Concept of sequencing & Interlocking, Standard symbols used for Electrical Wiring Diagram, Electrical Wiring diagrams for Starting, Stopping, Emergency shutdown, (Direct on line, star delta, soft starter) Protection devices for motors: Short circuit protection, Over load Protection, Over/ under voltage protection, Phase reversal Protection, high temperature and high current Protection, over speed, Reversing direction of rotation	10	

May	Braking, Starting with variable speeds, Jogging/Inching Motor Control Center: **Unit 4: Concept and wiring diagrams Pneumatic components:** Pneumatic Power Supply and its components: Pneumatic relay (Bleed & Non bleed, Reverse & direct), Single acting & Double acting cylinder, Special cylinders: Cushion, Double rod, Tandem, Multiple position, Rotary Filter Regulator Lubricator (FRL), Pneumatic valves (direction controlled valves, flow control etc), Special types of valves like relief valve, pressure reducing etc. Hydraulic components: Hydraulic supply, Hydraulic pumps, Actuator (cylinder & motor), Hydraulic valves	10	

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(H.O.D.)
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