

## Syllabus completion Report

T.Y.B.Sc. Physics (Sem V )

Year: 2022-2023

PHY-351: Mathematical Methods in Physics-II

Teacher: A.B.Kanawade

Chapter No.	Month	Contents	Remarks
1	07/09/2022 to 21/09/2022	<b>1: Curvilinear Co-ordinates</b>  Review of Cartesian, spherical and cylindrical co-ordinate,  transformation equation, General Curvilinear co-ordinate system:  Co-ordinate surface, co-ordinate lines, length, surfaces and  volume elements in curvilinear co-ordinate system.  Orthogonal curvilinear co-ordinate system, expressions for gradient, divergence,  Laplacian, and curl, special case for gradient, divergence and curl in Cartesian, spherical polar and cylindrical co-ordinate system,  Problems.	
2	14/10/2022 to 29/10/2022	<b>2: The Special Theory of Relativity</b>  Introduction,  Newtonian relativity, Galilean transformation equation,  Michelson-Morley experiment,  Postulates of special theory of relativity,  Lorentz transformations,  Lorentz transformations,  Kinematic effects of Lorentz transformation,	

		<p>Length contraction,</p> <p>Proper time,</p> <p>Problems.</p>	
<b>3</b>	<p>22/09/2022 to 03/10/2022</p>	<p><b>3: Partial Differential Equations</b></p> <p>Introduction to Partial differential equations (PDE),</p> <p>General methods for solving second order PDE,</p> <p>Method of separation of variables in Cartesian,</p> <p>Spherical polar and cylindrical co-ordinate system (two dimensional Laplace's equation, one dimensional Wave equation),</p> <p>Singular points (<math>x = x_0</math>),</p> <p>Solution of differential equation-Statement of Fuch's theorem,</p> <p>Frobenius method of series solution.</p>	
<b>4</b>	<p>04/10/2022 to 13/10/2022</p>	<p><b>4: Special Functions</b></p> <p>Introduction, generating function for Legendre Polynomials: <math>P_n(x)</math>,</p> <p>Properties of Legendre Polynomials,</p> <p>Generating function for Hermite Polynomials: <math>H_n(x)</math>,</p> <p>Properties of Hermite Polynomials,</p> <p>Bessel function of first kind: <math>J_n(x)</math>,</p> <p>Bessel function of first kind: <math>J_n(x)</math>,</p> <p>Properties of Bessel function of first kind,</p> <p>Problems.</p>	

## Syllabus completion Report

T.Y.B.Sc. Physics (Sem V )

Year: 2022-2023

PHY-3510 SEC (K): Smart Sensors & Transducer Technology, Teacher: A.B.Kanawade

Chapter No.	Month	Contents	Remarks
1	31/10/2022 to 04/11/2022	<p><b>1) Mechanical and Electromechanical sensor:</b></p> <p>Definition, principle of sensing &amp; transduction, classification.</p> <p>Resistive (potentiometric type): Forms, material, resolution, accuracy, sensitivity.</p> <p>Strain gauge: Theory, type, materials, design consideration,</p> <p>sensitivity, gauge factor, variation with temperature, adhesive, rosettes.</p> <p>LVDT: Construction, material, output input relationship, I/O curve, discussion.</p>	
2	06/11/2022 to 14/ 11/2022	<p><b>2) Capacitive sensors:</b></p> <p>Variable distance-parallel plate type, variable area-parallel plate,</p> <p>serrated plate/teeth type and cylindrical type,</p> <p>variable dielectric constant type, calculation of sensitivity.</p> <p>Stretched diaphragm type: microphone, response characteristics.</p>	
3	15/11/2022 to 18/11/2022	<p><b>3) Thermal sensors:</b></p> <p>Material expansion type: solid, liquid, gas &amp; vapor</p> <p>Resistance change type: RTD materials, tip sensitive &amp; stem sensitive type.</p>	

4	<p>19/11/2022 to 24/11/2022</p> <p>16/11/2022</p> <p>17/11/2022</p> <p>23/11/2022</p> <p>24/11/2022</p>	<p>Thermo emf sensor: types, thermoelectric power, general consideration,</p> <p>Junction semiconductor type IC and PTAT type.</p> <p><b>4) Magnetic sensors:</b></p> <p>Sensor based on Villari effect for assessment of force, torque, proximity,</p> <p>Wiedemann effect for yoke coil sensors,</p> <p>Thomson effect, Hall effect, and Hall drive, performance characteristics.</p> <p>Radiation sensors: LDR.</p> <p><b>Activity:</b> <b>Based on chapter I</b></p> <p>1) Linear displacement measurement using LVDT.</p> <p><b>Based on chapter II</b></p> <p>2) Displacement/pressure measurement using microphone.</p> <p><b>Based on chapter III</b></p> <p>3) Measurement of temperature using Thermocouple transducer.</p> <p>4) Silicon diode as temperature sensor</p>	
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## Syllabus completion Report

S.Y.B.Sc. (Physics) (Sem III)  
PHY-232(A): Electronics-I

Year: 2022-2023  
Teacher: A.B.Kanawade

Chapter No.	Month	Contents	Remarks
1	22/9/ 2022 to 6/10/2022	<p><b>1. Network Theorem:</b>                      1.1 Krichhoff's Law                      1.2 Voltage and current Divider Circuit                      1.3 Thevenin's Theorem                      1.4 Norton's Theorem                      1.5 Superposition Theorem                        1.6 Maximum Power transfer theorem (With proof)                      1.7 Problems</p> <p><b>2. Study of Transistor</b>  <b>2.1 Bijunction Transistor</b></p>	
2	7/10/2022 to 4/11/ 2022	<p>1. Revision of bipolar Junction Transistor, Types, Symbol and basic action.</p> <p>2. Configuration (Common Base, Common Emitter and Common Collector)</p> <p>3. Current Gain Factors (<math>\alpha</math> and <math>\beta</math>) and their relations</p> <p>4. Input, Output and transfer Characteristic of CE Configuration</p> <p>5. Biasing method and Voltage Divider</p> <p>6. DC Load line (CE), Operating Point (Q-point)</p> <p>7. Transistor as a switch                      8. Problems</p> <p><b>2.2 Uniunction Transistor:</b></p> <p>1. Symbol, Types, Construction, Working Principle, I-V characteristics, Specifications and parameters of Uniunction Transistor (UJT)</p> <p>2. UJT as a relaxation Oscillator.</p>	

3	13/11/ 2022 to 24/11/ 2022	<p><b>3.Operational Amplifiers and Application</b></p> <p><b>3.1 Operational Amplifiers:</b></p> <ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Ideal and practical Characteristics</li> <li>3. Operational Amplifier: IC741-Block Diagram and Pin diagram</li> <li>4. Concept of Virtual Ground</li> <li>5. Inverting and Non-inverting operational amplifiers with concept of gain</li> <li>6. Operational amplifier as an adder and subtractor</li> <li>7. Problems</li> </ol> <p><b>3.2 Oscillators:</b></p> <ol style="list-style-type: none"> <li>1. Concept of Positive and negative feed back</li> <li>2. Barkhausein Criteria for an oscillator</li> <li>3. Construction, working and application of phase shift oscillator using IC741</li> <li>4. Problems</li> </ol>	
4	23/12/ 2022 to 17/01/ 2023	<p><b>4. Number System and Logic Gates</b></p> <ol style="list-style-type: none"> <li>1. Number System: Binary, Binary coded Decimal (BCD), Octal, Hexadecimal</li> <li>2. Addition and Subtraction of binary numbers and binary fractions using one's and two's complement</li> <li>3. Basic Logic gates (OR, AND, NOT)</li> <li>4. Derived gates: NOR, NAND, EXOR, EXNOR, with symbols and truth table</li> <li>5. Boolean Algebra</li> <li>6. De Morgan's theorem and its verification</li> <li>7. Problems</li> </ol>	