B.Sc. Forensic Science: Semester-IV	
FST 404: Physics- IV	
Teaching Scheme	**Examination Scheme**
Lectures: 3 hrs/Week	Class Test -12 Marks
Tutorials: 1 hr/Week	Teachers Assessment – 6 Marks
Credits: 4	Attendance – 12 Marks
	End Semester Exam – 70 marks

Course outcomes:

- Recognize the difference between the structure of space & time in Newtonian & Relativistic mechanics.
- Understand the physical significance of consequences of Lorentz transformation equations.
- Comprehend the wave-particle duality.
- Develop an understanding of the foundational aspects of Quantum Mechanics.
- Study the comparison between various biasing techniques.
- Study the classification of amplifiers.
- Comprehend the use of feedback and oscillators.
- Comprehend the theory and working of optical fibers along with its applications.

Unit I – Relativity-Experimental Background

- Structure of space & time in Newtonian mechanics and inertial & non-inertial frames. Galilean transformations. Newtonian relativity. Galilean transformation and Electromagnetism. Attempts to locate the Absolute Frame: Michelson-Morley experiment and significance of the null result. Einstein's postulates of special theory of relativity.

Unit II – Relativity-Relativistic Kinematics

- Structure of space & time in Relativistic mechanics and derivation of Lorentz transformation equations (4-vector formulation included). Consequences of Lorentz Transformation Equations (derivations & examples included): Transformation of Simultaneity (Relativity of simultaneity); Transformation of Length (Length contraction); Transformation of Time (Time dilation); Transformation of Velocity (Relativistic velocity addition); Transformation of Acceleration; Transformation of Mass (Variation of mass with velocity). Relation between Energy & Mass (Einstein's mass & energy relation) and Energy & Momentum.

Unit III – Inadequacies of Classical Mechanics

- Particle Properties of Waves: Spectrum of Black Body radiation, Photoelectric effect, Compton effect and their explanations based on Max Planck's Quantum hypothesis. Wave Properties of Particles: Louis de Broglie's hypothesis of matter waves and their experimental verification by Davisson-Germer's experiment and Thomson's experiment.

Unit IV – Introduction to Quantum Mechanics

- Matter Waves: Mathematical representation, Wavelength, Concept of Wave group, Group (particle) velocity, Phase (wave) velocity and relation between Group & Phase velocities. Wave Function: Functional form, Normalization of wave function, Orthogonal & Orthonormal wave functions and Probabilistic interpretation of wave function based on Born Rule.

Unit V – Transistor Biasing

- Faithful amplification & need for biasing. Stability Factors and its calculation for transistor biasing circuits for CE configuration: Fixed Bias (Base Resistor Method), Emitter Bias (Fixed Bias with
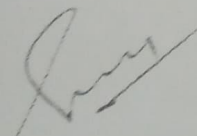
Head
Department of Biotechnology

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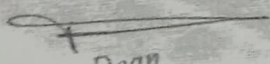Invertis University
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Emitter Resistor), Collector to Base Bias (Base Bias with Collector Feedback) &, Voltage Divider Bias. Discussion of Emitter-Follower configuration.
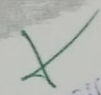
Suggested Readings:

1. A. Beiser, Shobhit Mahajan, –Concepts of Modern Physics: Special Indian Editionl, McGraw Hill, 2009, 6e
2. John R. Taylor, Chris D. Zafiratos, Michael A.Dubson, –Modern Physics for Scientists and Engineersl, Prentice-Hall of India Private Limited, 2003, 2e
3. R.A. Serway, C.J. Moses, and C.A. Moyer, –Modern Physicsl, Cengage Learning India Pvt. Ltd, 2004, 3e
4. R. Resnick, –Introduction to Special Relativityl, Wiley India Private Limited, 2007
5. R. Murugeshan, Kiruthiga Sivaprasath, —Modern Physicsl, S. Chand Publishing, 2019, 18e
6. R.L. Boylestad, L. Nashelsky, –Electronic Devices and Circuit Theoryl, Prentice-Hall of India Pvt. Ltd., 2015, 11e
7. J. Millman, C.C. Halkias, Satyabrata Jit, –Electronic Devices and Circuitsl, McGraw Hill, 2015, 4e
8. B.G. Streetman, S.K. Banerjee, –Solid State Electronic Devicesl, Pearson Education India, 2015, 7e
9. J.D. Ryder, –Electronic Fundamentals and Applicationsl, Prentice-Hall of India Private Limited, 1975, 5e
10. John M. Senior, –Optical Fiber Communications: Principles and Practicel, Pearson Education Limited, 2010, 3e
11. John Wilson, John Hawkes, —Optoelectronics: Principles and Practicel, Pearson Education Limited, 2018, 3e
12. S.L. Gupta, V. Kumar, –Hand Book of Electronicsl, Pragati Prakashan, Meerut, 2016, 43e

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