The paper of 'Physics of Devices and Instruments' for the fifth semester(third year) students of the course Physics Hons. of Delhi University.

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The paper was held on 5th December 2015.

This particular paper was taught for the first time only to the erstwhile FYUP students.
I kinda liked the subject but couldn't answer all the questions in the exam as it was very tough.
Most of the questions seemed out of syllabus.

I can only hope for lenient marking.

This questions from this paper can also be used to prepare for the subject, Analog Devices, Instrumentation as well as Communication, as it was a hybrid of all the three.

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If you have a query, just comment in the section below and I will get back to you, ASAP.
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The syllabus for the paper was:

PHYSICS-VIIIA: PHYSICS OF DEVICES AND INSTRUMENTS

UNIT-1

Devices: Characteristic and Equivalent Circuits of UJT and JFET. Metal-semiconductor and metal oxide semiconductor junctions. MOSFET– their frequency limits. Enhancement and Depletion Mode MOSFETS, Charge coupled devices. (13 Lectures)

UNIT-2

Power supply and Filters: Block Diagram of a Power Supply, Qualitative idea of C and L Filters. IC Regulators, Line and load regulation, Short circuit protection (3 Lectures)

Active and Passive Filters, Low Pass, High Pass, Band Pass and band Reject Filters. (4 Lectures)

Multivibrators: Astable and Monostable Multivibrators using transistors. (2 Lectures)

Phase Locked Loop (PLL): Basic Principles, Phase detector (XOR and edge triggered), Voltage Controlled Oscillator (Basics, varactor). Loop Filter – Function, Loop Filter Circuits, transient response, lock and capture. Basic idea of PLL IC (565 or 4046). (4 Lectures)

UNIT-3

Transducers and Sensors (Working principle, efficiency, applications): Active and passive transducers. Characteristics of Transducers. Transducers as electrical element and their signal conditioning. Temperature transducers: RTD, Thermistor. Position transducer: Strain gauge, Piezoelectric transducer. Inductance transducer: Linear variable differential transformer (LVDT), Capacitance transducer. Magnetoresistive transducer. Radiation Sensors: Principle of gas filled detector, ionization chamber, scintillation detector. (10 Lectures)

UNIT-4

Introduction to communication systems: Block diagram of electronic communication system, Need for modulation. Amplitude modulation. Modulation Index. Analysis of Amplitude Modulated wave. Sideband frequencies in AM wave. CE Amplitude Modulator. Demodulation of AM wave using Diode Detector. basic idea of Frequency, Phase, Pulse and Digital Modulation including ASK, PSK, FSK. (12 lectures)

Reference Books:

- Physics of Semiconductor Devices, S.M. Sze & Know K. Ng, 3rd Ed., 2008, John Wiley and Sons
- Electronic devices and integrated circuits, Ajay Kumar Singh, 2011, PHI Learning Pvt. Ltd.
- Op-Amps & Linear Integrated Circuits, R.A.Gayakwad,4th Ed., 2000, PHI Learning Pvt.Ltd.
- Electronic Devices and Circuits, A. Mottershead, 1998, PHI Learning Pvt. Ltd.

- Electronic Communication systems, G. Kennedy, 1999, Tata McGraw Hill.
- Measurement, Instrumentation and Experiment Design in Physics & Engineering, M.Sayer and A. Mansingh, 2005, PHI Learning Pvt. Ltd.
- Introduction to Measurements & Instrumentation, A.K.Ghosh, 3rd Ed.,2009,PHI Learning Pvt.Ltd.
- Electronic Devices & circuit Theory, R.L. Boylestad and L.D. Nashelsky, 2009, Pearson India

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Manas Sharma

I’m a physicist specializing in computational material science with a PhD in Physics from Friedrich-Schiller University Jena, Germany. I write efficient codes for simulating light-matter interactions at atomic scales. I like to develop Physics, DFT, and Machine Learning related apps and software from time to time. Can code in most of the popular languages. I like to share my knowledge in Physics and applications using this Blog and a YouTube channel.

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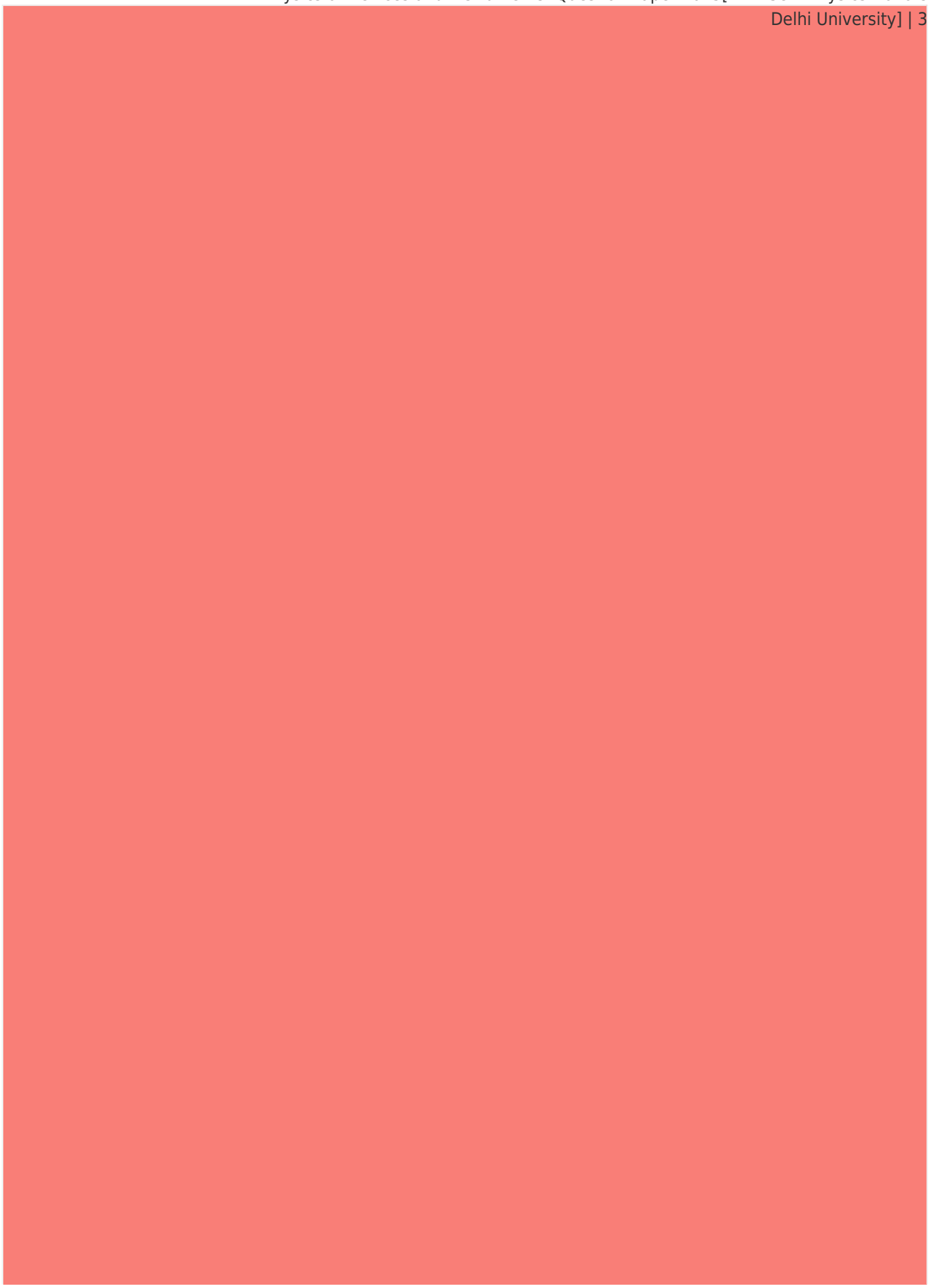

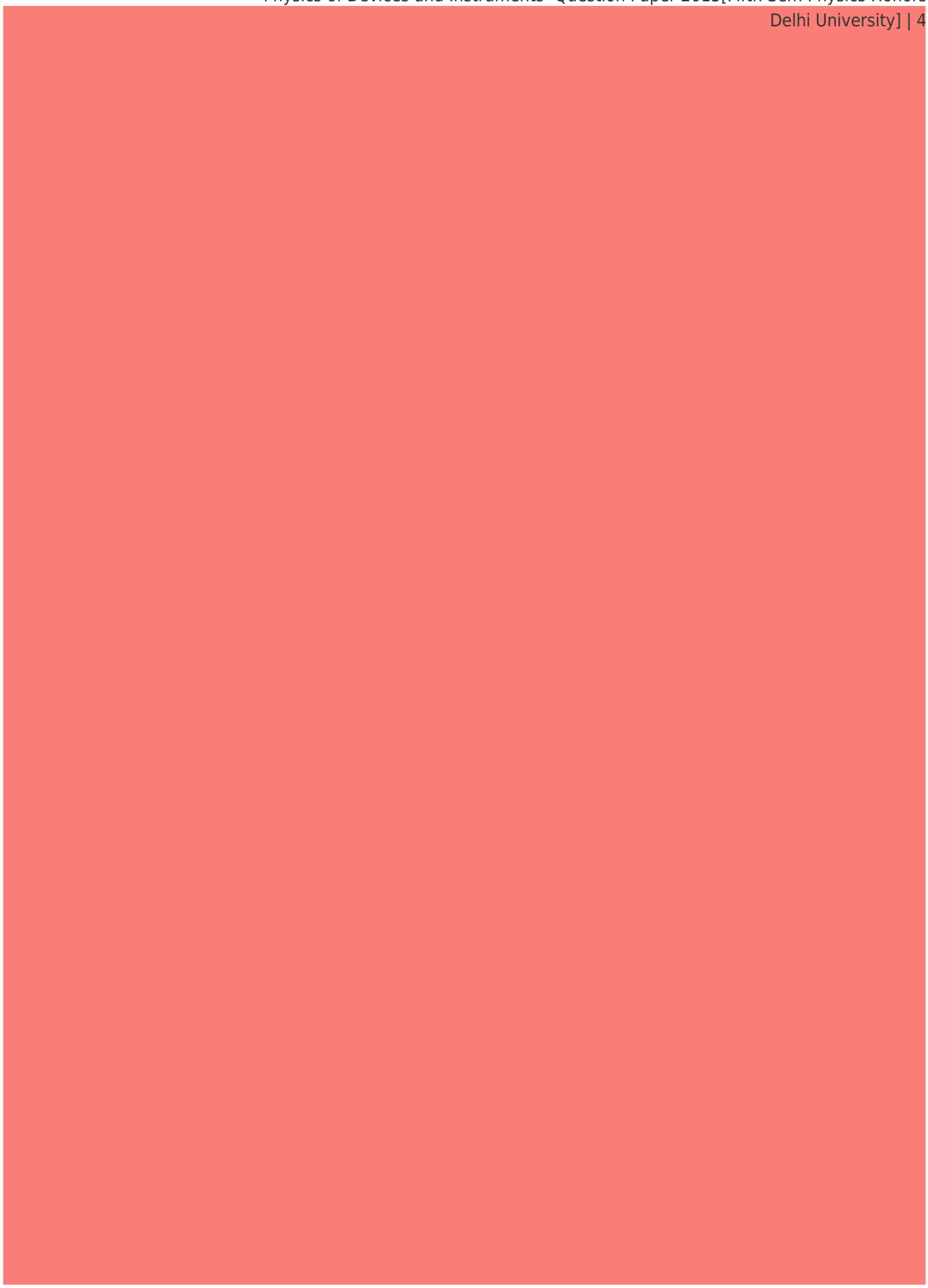

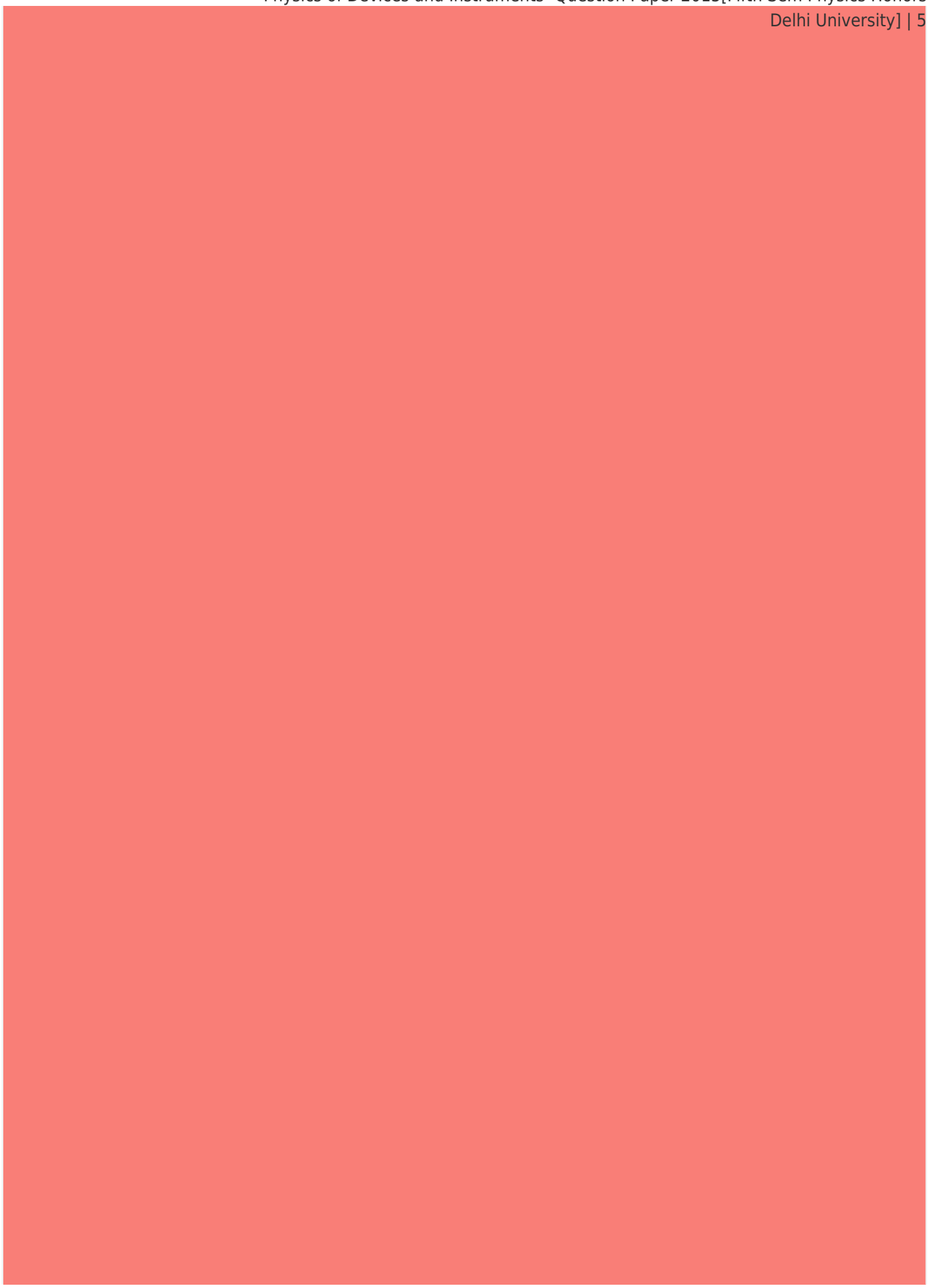

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