

Proposed Course Structure of B. Tech. (Engineering Physics)

Semester I

| S. No. | Course Code | Title of the course | Subject Area | L-T-P | Credits |
|--------|-------------|--------------------------------------|--------------|-------|-----------|
| 1. | | Mathematics I | IC | 2-1-0 | 3 |
| 2. | | Python Programming + Lab | IC | 2-0-2 | 3 |
| 2. | | Environmental Science | IC | 1-0-0 | 1 |
| 3. | | Soft Skills Foundation Lab | IC | 0-0-2 | 1 |
| 4. | | Ethics and Human Values | IC | 1-0-0 | 1 |
| 5. | | Engineering Chemistry | IC | 2-1-0 | 3 |
| 6. | | Modern Physics Lab | IC | 0-0-2 | 1 |
| 7. | | Engg. Drawing and Sketching Lab | IC | 0-0-2 | 1 |
| 7. | 22BMT922 | Management Principles for Engineers* | PL/EAS | 3-0-0 | 3 |
| 8. | PHT111 | Applied Optics | PC | 3-0-0 | 3 |
| | | Total | | | 20 |

*To be taught by the Department of Management Studies

Semester II

| S. No. | Course Code | Title of the course | Subject Area | L-T-P | Credits |
|--------|-------------|--|--------------|-------|-----------|
| 1. | | Mathematics II | IC | 2-1-0 | 3 |
| 2. | | Makers Lab | IC | 3-0-6 | 6 |
| 3. | | Data Science/ Analytics/Visualization | IC | 2-0-0 | 2 |
| 5. | PHT121 | Mathematical Methods in Physics | PC | 3-1-0 | 4 |
| 6. | PHT122 | Biophysics | PC | 2-0-0 | 2 |
| 7. | PHT123 | Electromagnetic Theory | PC | 3-0-0 | 3 |
| | | Total | | | 20 |

Semester III

| S. No. | Course Code | Title of the course | Subject Area | L-T-P | Credits |
|--------------|-------------|--------------------------------------|--------------|-------|-----------|
| 1. | | Soft Skills Advanced Lab | IC | 0-0-2 | 1 |
| 2. | | Design thinking for Innovation | IC | 2-0-0 | 2 |
| 2. | | Engineering Economics | IC | 3-0-0 | 3 |
| 3. | PHT211 | Engineering Mechanics and Relativity | PC | 2-1-0 | 3 |
| 4. | PHT212 | Foundations of Quantum Theory | PC | 3-0-0 | 3 |
| 5. | PHT213 | Physics of Semiconductor Devices | PC | 2-0-0 | 2 |
| 6. | PHT214 | Analog and Digital Electronics | PC | 3-0-0 | 3 |
| 7. | PHP215 | Analog and Digital Electronics Lab | PC | 0-0-6 | 3 |
| 8. | | PE 01 | PE | 3-0-0 | 3 |
| Total | | | | | 23 |

Semester IV

| S. No. | Course Code | Title of the course | Subject Area | L-T-P | Credits |
|--------------|-------------|---|--------------|-------|-----------|
| 1. | PHT221 | Thermodynamics and Statistical Mechanics | PC | 3-1-0 | 4 |
| 2. | PHT222 | Physics of Energy Materials | PC | 3-0-0 | 3 |
| 3. | PHT223 | Laser and its Applications | PC | 2-1-0 | 3 |
| 4. | PHT224 | Optoelectronics | PC | 3-0-0 | 3 |
| 5. | PHP225 | Laser and Optoelectronics Lab | PC | 0-0-8 | 3 |
| 6. | 22MST241 | Fundamentals of Materials Science and Engineering # | PL/EAS | 3-0-0 | 3 |
| 7. | | PE 02 | PE | 3-0-0 | 3 |
| Total | | | | | 22 |
| | M/H | MINOR / HONOURS COURSE 1 | | | 3 |

To be taught by the Material Research Centre

Semester V

| S. No. | Course Code | Title of the course | Subject Area | L-T-P | Credits |
|--------|-------------|---|--------------|-------|-----------|
| 1. | PHT311 | Condensed Matter Physics | PC | 3-0-0 | 3 |
| 2. | PHT312 | Numerical Analysis through MATLAB | PC | 2-1-0 | 3 |
| 3. | PHT313 | Introduction to Quantum Technologies | PC | 3-0-0 | 3 |
| 4. | PHT314 | Thin Film Deposition and Characterization | PC | 2-0-2 | 3 |
| 4. | PHT315 | Semiconductor device modelling and Simulation | PC | 3-0-0 | 3 |
| 5. | PHP316 | Engineering Materials Lab | PC | 0-0-6 | 3 |
| 6. | | PE 03 | PE | 3-0-0 | 3 |
| 7. | | PE 04 | PE | 3-0-0 | 3 |
| | | Total | | | 24 |
| | M/H | MINOR / HONOURS COURSE 2 | | | 3 |

Semester VI

| S. No. | Course Code | Title of the course | Subject Area | L-T-P | Credits |
|--------|-------------|--|--------------|-------|-----------|
| 1. | PHT321 | Atomic & Molecular Spectroscopy | PC | 3-0-0 | 3 |
| 2. | PHT322 | Advanced Computational Tools for Physicist | PC | 2-1-0 | 3 |
| 3. | PHT323 | Physics of Nuclear Radiations and Applications | PC | 2-1-0 | 3 |
| 4. | PHP324 | Nuclear Radiations and Spectroscopy Lab | PC | 0-0-6 | 3 |
| 5. | | PE 05 | PE | 3-0-0 | 3 |
| 6. | | PE 06 | PE | 3-0-0 | 3 |
| 7. | | PE 07 | PE | 3-0-0 | 3 |
| 8. | | OE1 | OE | 3-0-0 | 3 |
| | | Total | | | 24 |
| | M/H | MINOR / HONOURS COURSE 3 | | | 3 |

Semester VII

| S. No. | Course Code | Title of the course | Subject Area | L-T-P | Credits |
|--------|-------------|---------------------------------|----------------|-------|-----------|
| 1. | PHT411 | AI/ML for Physical Systems | PC | 2-1-0 | 3 |
| 2. | | OE 02 | OE | 3-0-0 | 3 |
| 3. | | PE 08 | PE | 3-0-0 | 3 |
| 4. | | PE 09 | PE | 3-0-0 | 3 |
| 5. | | PE 10 | PE | 3-0-0 | 3 |
| 6. | | Industrial Training/seminar | Industrial T/S | | 2 |
| 7. | | Minor Project | Project | 0-0-6 | 3 |
| | | Total | | | 20 |
| | M/H | MINOR / HONOURS COURSE 4 | | | 3 |

Semester VIII

| S. No. | Course Code | Title of the course | Subject Area | L-T-P | Credits |
|--------|-------------|---------------------------------|--------------|--------|----------|
| 1. | | OE 03 | OE | 3-0-0 | 3 |
| 3. | | Major Project | Project | 0-0-12 | 6 |
| | | Total | | | 9 |
| | M/H | MINOR / HONOURS COURSE 5 | | | 3 |

Total Credits: 162

List of Program Electives

| S. No. | Program Elective Basket |
|--------|--|
| | Semiconductor & Photonics |
| 1. | Semiconductor Devices and Circuits |
| 2. | Semiconductor Device Processing and IC Fabrication |
| 3. | Semiconductor Devices for Next Generation Field-Effect Transistors |
| 4. | Surface Physics and Engineering |
| 5. | Advanced Micro- and Nanofabrication Technology and Process |
| 6. | Nanophotonics |
| 7. | Advanced Photonic Materials |
| 8. | Medical Applications of Radiation Physics |
| | Energy Systems |
| 9. | Solar Energy & Physics of Solar Cells |
| 10. | Energy Storage Systems |
| 11. | Hydrogen Energy and Fuel Cells |
| 12. | Physics of Renewable Systems |
| 13. | Battery Technology & Electric Vehicles |
| 14. | Nuclear Energy Systems and Sustainable Power Generation |
| | Soft Materials |
| 15. | Engineering Biomaterials |
| 16. | Organic Electronics Material and Devices |
| 17. | Biomaterials and Tissue Engineering |
| 18. | Wearable sensors for healthcare |
| 19. | Nano-engineering of Soft Materials |
| 20. | Soft Materials |
| | Quantum Science & Technology |
| 21. | Quantum Communication |
| 22. | Quantum Imaging |
| 23. | Quantum Sensing and Metrology |
| 24. | Quantum Materials and Devices |
| 25. | Quantum Optics |

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| 26. | Foundation of Quantum Computation |
| 27. | Quantum Computing for Physical Systems |
| | Theoretical Physics |
| 28. | Astronomy and Astrophysics |
| 29. | Advanced Quantum Mechanics |
| 30. | Geometrical Approach to Gravity |
| 31. | Group Theory & Applications |
| 32. | Particle Detector and its Technology |
| 33. | Plasma Science and Technology |
| 34. | Accelerators and Applications |
| 35. | Fundamentals of Space Physics & Applications |

Honours offered by the Department of Physics

| Advanced Materials Physics | |
|-----------------------------------|---|
| S. No. | Course Name |
| 1. | Advanced Condensed Matter Physics |
| 2. | Advanced Statistical Mechanics |
| 3. | Frontiers in Nanomaterials and Nanotechnology |
| 4. | Advanced Characterization Techniques |
| 5. | Advanced Physics lab |