Annexure – IV

VIGNAN'S

# DEPARTMENT OF PHYSICS

## CIRCULAR

Date: 01.03.2025

The Department of Physics is going to conduct a Board of Studies (BoS) meeting for the B.Tech. program on **14.03.2025** from 9.00 AM in offline mode. The venue for the meeting is VBT07, Third floor, A Block, VFSTR. All the members are requested to make it convenient to attend the meeting.

**The members are**

| Sl. No | Name of the member | Designation and Address | Role |
|---|---|---|---|
| 1 | Dr. K. V Madhuri | Professor and<br>Head of the Department | Chairperson |
| 2 | Prof. G. Hema Chandra | Professor,<br>Department of Physics,<br>VNIT Nagpur, | External member<br>(Academia) |
| 3 | Dr. Y. Bharath Kumar Reddy | Director (Techno Commercial)<br>ABC Cleantech. Pvt.Ltd | External member<br>(Industry) |
| 4 | Dr. Neeraj Dwivedi | Principal Scientist,<br>CSIR-Advanced Materials and Processes Research Institute (CSIR-AMPRI) | Invited member<br>(Research) |
| 5 | Dr. S. Surendra Babu | Scientist- 'F', Directorate of laser systems,<br>Research Centre Imarat (DRDO Lab),<br>Vignana Kancha, Hyderabad. | Invited member |
| 6 | Prof. J. N. Kiran | Professor,<br>Dept. of Physics, VFSTR. | Internal member |
| 7 | Prof. M. Sreenivasulu | Professor,<br>Dept. of Physics, VFSTR. | Internal member |
| 8 | Dr. M L N Madhu Mohan | Associate Professor,<br>Dept. of Physics, VFSTR. | Internal member<br>(R&D nominee) |
| 9 | Dr. Ch. Tirupataiah | Associate Professor,<br>Dept. of Physics, VFSTR. | Internal member |
| 10 | Dr. Shaik Habibuddin | Associate Professor,<br>Dept. of Physics, VFSTR. | Internal member |
| 11 | Dr. Ashutosh Upadhyay | Assistant Professor,<br>Dept. of Physics, VFSTR | Internal member<br>(School nominee) |
| 12 | Dr. B. Nageswara Rao | Assistant Professor,<br>Dept. of Physics, VFSTR. | Internal member |
| 13 | Dr. P. Srinivasa Rao | Assistant Professor,<br>Dept. of Physics, VFSTR. | Internal member |
| 14 | Dr. K. Ramesh Babu | Assistant Professor,<br>Dept. of Physics, VFSTR. | Internal member<br>(off-campus) |
| 14 | Dr. M. Ramanjaneyulu | Associate Professor, (BoA)<br>Dept. of Physics, VFSTR. | Member Secretary |

**Agenda of the BoS Meeting:**

1. To discuss and finalize the syllabi of various Physics courses offered by the Department of Physics in R25 B.Tech., programs along with LTP structure.
2. To approve two common physics courses, such as Engineering Physics for primarily non-bio branches (majorly MPC students) and Applied Physics for Bio-related branches (majorly Bi PC students), with major changes in the contents of the syllabuses.
3. To approve a special course for 2nd year Biomedical engineering students with the title of Physics for Biomedical Engineering and for 2nd year CSE-IoT students with the title of Physics for Quantum computing.
4. Approval of four open elective courses such as Thin films technology, Analytical techniques for engineers and Green energy technology and quantum physics for next generation computing.
5. Approval of two minor program with the title of Nano technologies and Quantum technology. The first minor program contains four courses titled, Electromagnetic theory, Quantum Mechanics, Lasers and Micro & Nano materials for nano technologies where as the second minor program Quantum Technology consists of four courses titled as Quantum Principles, Structures and Computing, Quantum Computing Theory & Practices, Quantum Computation & Applications, Quantum Algorithms & Cryptography.
6. To Discuss the SDG and IKS components in the syllabus.
7. To approve the R25-C25 curriculum, syllabus and assessment schemes of B.Tech. Programme and recommend to the Academic council.
8. Discussion on assessment results for the past semester.
9. Any other points with the permission of chairperson.

Member Secretary

Chairperson

Prof. K.V. Madhuri
Head
Department of Physics
School of Applied Sciences & Humanities
Vignan's Foundation for Science, Technology and Research
(Deemed to be University)
Vadlamudi, Guntur-522213

Annexure – V

VIGNAN'S

# DEPARTMENT OF PHYSICS

Date: 14.03.2025

## Minutes of Board of Studies Meeting

Department of Physics has conducted the Board of Studies (BoS) meeting for the B.Tech. program on 14.03.2025 at VBT-07, A-block from 09.00 AM to 04.00 PM under the Chairmanship of the Head, Department of Physics along with the committee and external members with external invitees in offline mode.

**Agenda of the BoS Meeting:**

1. To discuss and finalize the syllabi of various Physics courses offered by the Department of Physics in R25 B.Tech., programs along with LTP structure.
2. To approve two common physics courses, such as Engineering Physics for primarily non-bio branches (majorly MPC students) and Applied Physics for Bio-related branches (majorly BiPC students), with major changes in the contents of the syllabuses.
3. To approve a special course for 2nd year Biomedical engineering students with the title of Physics for Biomedical Engineering and for 2nd year CSE-IoT students with the title of Physics for Quantum computing.
4. Approval of four open elective courses such as Thin films technology, Analytical techniques for engineers and Green energy technology and quantum physics for next generation computing.
5. Approval of two minor program with the title of Nano technologies and Quantum technology. The first minor program contains four courses titled, Electromagnetic theory, Quantum Mechanics, Lasers and Micro & Nano materials for nano technologies where as the second minor program Quantum Technology consists of four courses titled as Quantum Principles, Structures and Computing, Quantum Computing Theory & Practices, Quantum Computation & Applications, Quantum Algorithms & Cryptography.
6. To Discuss the SDG and IKS components in the syllabus.
7. To approve the R25-C25 curriculum, syllabus and assessment schemes of B.Tech. Programme and recommend to the Academic council.
8. Discussion on results for the past semester.
9. Any other points with the permission of the chairperson.

The following BOS members are present for the BoS (Physics) meeting held on 14-03-2025

| Sl. No | Name of the member | Designation and Address | Signature |
|---|---|---|---|
| 1 | Dr. K. V Madhuri | Chairperson & Professor and Head of the Department | |
| 2 | Prof. G. Hema Chandra | External member & Professor, Department of Physics, VNIT Nagpur | |
| 3 | Dr. Y. Bharath Kumar Reddy | External member & Director (Techno Commercial) ABC Cleantech. Pvt.Ltd | |
| 4 | Dr. S. Surendra Babu | External member & Scientist – 'F' Directorate of Laser Systems, Research Centre Imarat (DRDO Lab) | |
| 5 | Prof. M. Sreenivasulu | Member, Professor, Dept. of Physics, VFSTR. | |
| 6 | Dr. M L N Madhu Mohan | Dean R &D Nominee, Associate Professor, Dept. of Physics, VFSTR. | |
| 7 | Dr. Ch. Tirupataiah | Member, Associate Professor, Dept. of Physics, VFSTR. | |
| 8 | Dr. Habibuddin Shaik | Member, Associate Professor, Dept. of Physics, VFSTR. | |
| 9 | Dr. Ashutosh Upadhyay | Member, Assistant Professor, Dept. of Physics, VFSTR. | |
| 10 | Dr. B. Nageswara Rao | Member, Assistant Professor, Dept. of Physics, VFSTR. | |
| 11 | Dr. P. Srinivasarao | Assistant Professor, Dept. of Physics, VFSTR. | |
| 12 | Dr. K Ramesh Babu | Member, Assistant Professor, Dept. of Physics, FSTR (off-campus) | |
| 13 | Dr. M. Ramanjaneyulu | Associate Professor, (BoA) Dept. of Physics, VFSTR. | |

The following members have taken leave of absence:

1. Dr. Neeraj Dwivedi
2. Prof. J. N. Kiran

Chairperson, **Dr. K. V. Madhuri**, Professor and Head, Department of Physics, VFSTR initiated the meeting by welcoming and introducing the external members and invitees to the internal members. The chairperson presented the *NEP 2020 Compliant Regulation - R25-C25* which emphasis on creating *learning centric* (continuous learning and continuous assessment model), offering B.Tech., B.Tech. with Honours/Minors providing lateral entry and honorable exit. She also emphasized the significance of open electives and the upcoming minor programs to be offered by the Department of Physics. In particular, she provided a detailed overview of the Quantum Technology minor program, highlighting its relevance and potential benefits for future careers.

**The following points were discussed in the BoS meeting:**

1. Regulation R25-C25.
2. Curriculum structure with credits, credits distribution (L-T-P-SL).
3. Significance of self-learning (SL).
4. 2 Modules, Module-1 is fundamental with 2 units and Module-2 is advanced topics with 3 units.
5. Assessment methods (Formative & Summative).
6. Grading Schemes.
7. Open Elective and Minor courses (streams/pools).
8. SDG Mapping and incorporation of IKS components.
9. Consideration of new program outcomes (POs) as prescribed by the NBA.
10. Discussion on the past Semester results

**The following resolutions are made after the discussions:**

1. Dr. P Srinivasarao and Dr. M. Ramanjaneyulu presented Engineering Physics course to BoS members and is focused primarily for non-bio branches of 1st year B.Tech students. The course was accepted with minor change suggested by Prof. G. Hema Chandra as tunnelling diode needs to be explained later in module 2 under semiconductor section.
2. Dr. B. Nageswara Rao and Dr. K.V Prasad presented the Applied Physics course to BoS members and is focused mainly for bio branch students of 1st year B. Tech students. BoS members Prof. G. Hema Chandra and Dr. Y. Bharath Kumar Reddy suggested to improve the syllabus for fluid dynamics after consulting with mechanical department. In unit 2 quantum mechanics, asked to remove tunnelling diode. Dr. S. Surendra Babu suggested that, replace semiconductor diode laser to Nd: YAG laser also include laser safety in module 2 and add more details in the applications of optical fibres in the areas of food quality checking and safety monitoring.
3. Dr. Habibuddin Shaik presented a special course that is going to be offered for the 2nd year Biomedical engineering (BM) students which is primary focus on the semiconductor physics and devices. Prof. G. Hema Chandra suggested the following contents need to be added such

as, introduction to EM spectrum and remove/revise losses in optical fibres which will not repeat from 1st year course. Dr. Y. Bharath Kumar Reddy suggested to remove endoscopy, add V-number in optical fibres and also add applications of sensors specially in semiconductor physics.

4. Dr. M. Sreenivasulu presented Analytical Techniques For Characterization Of Materials - Open elective course for 2nd or 3rd year B.Tech students of all branches and is accepted.
5. Dr. B. Nageswara Rao and Dr. P. Srinivasa Rao presented Green energy technologies- Open elective course for 2nd or 3rd year B. Tech students of all branches. Dr. Y. Bharath Kumar Reddy suggested to be incorporate homo and hetero cells and organic photovoltaic and tandem cells. Limitations, advantages and disadvantages need to be addressed in the solar photovoltaics. Include sodium based cell technology.
6. Dr. M. Ramanjaneyulu and Dr. K. V Madhuri presented the Thin film technology-Open elective for 2nd or 3rd year B.Tech students of all branches. Prof. G. Hema Chandra suggested to include turbo pumps in vacuum pumps unit and remove cryogenic pumps. In the unit 2, confine only to homogeneous growth. Lithography part need to be removed.
7. Dr. Ashutosh Upadhyay presented open elective course on the quantum physics for next generation computing. Prof. G. Hema Chandra suggested to modify the order in the syllabus in all the units for continuity of the topics.
8. Minor program with the title of Nano technologies which contains four courses such as Electromagnetic theory, Quantum Mechanics for Engineering, Lasers and Micro & Nano materials were presented by Dr. T. Srinivasa Reddy, Dr. Ch. Tirupataiah, Dr. M. Venkaiah, and Dr. M.L.N Madhu Mohan. BoS members suggested to change the title of minor into **Fundamentals of Nanotechnology**. There were few minor suggestions given in electromagnetic theory and lasers and were incorporated.
9. Minor program with the title of Quantum technologies which contains four courses such as Quantum Principles, Structures and Computing, Quantum Computing Theory & Practices, Quantum Computation & Applications, Quantum Algorithms & Cryptography for Quantum technologies were prepared and presented by Dr. Ashutosh Upadhyay and Dr. K. V Madhuri to the BOS members. BoS members suggested to reorder the topics in the syllabus and suggested few topics to include in the Quantum Principles, Structures and Computing.
10. A special course was presented with title Physics for quantum computing for 2nd year B.Tech., CSE-IoT students is presented and is accepted.
11. BoS members approved to float, two different courses for the 1st B. Tech students and the detailed syllabus and LTP structure are provided in Appendix-I.

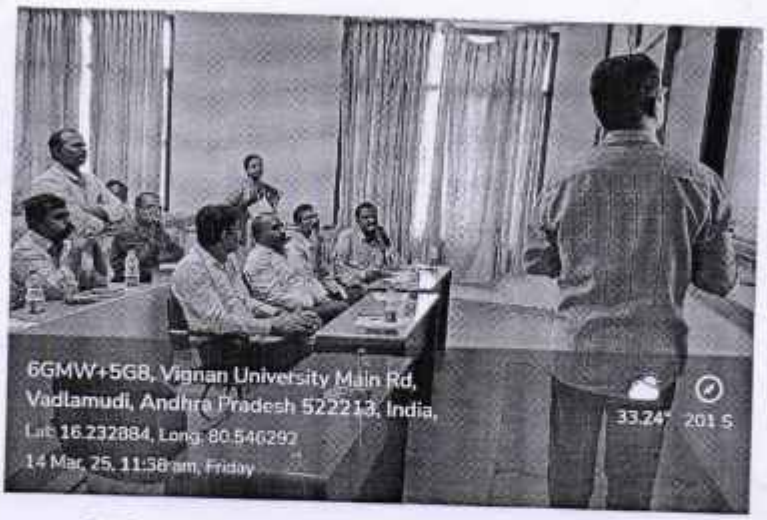
12. Three open electives will be offered to 2nd and 3rd year B. Tech students. List of approved open electives are provided in Appendix-I
13. The curriculum is encompassing the courses that enable employability or entrepreneurship or skill development, provided in Appendix- II.
14. The significant changes are made in the content of all courses for group of allied branches and hence the courses are considered as new courses provided in Appendix- III.
15. Total average percentage of syllabus revision/modification was about 30% compared to previous curriculum of R24, C24.

**The following are the observations:**

1. Major restructuring has taken place in the curriculum which is oriented towards continuous learning and assessment based on Module structure.
2. R25-C25 curriculum structure including list of open electives, Minor courses of All B.Tech., programme. (**Appendix - I**)
3. The curriculum is encompassing the courses that enable employability or entrepreneurship or skill development, provided in **Appendix - II**.
4. Total average percentage of syllabus revised was **30%** compared to previous curriculum provided in **Appendix - III**.
5. The significant changes are made in the content of all courses and hence the courses are considered as new courses provided in **Appendix - IV**.
6. **Indian Knowledge System (IKS)** components are incorporated in the relevant courses and the details are mentioned in **Appendix - V**.
7. The courses in the curricula are mapped with the **Sustainable Development Goals (SDG)** and the mapping details are provided in **Appendix - VI**.
8. Feedback from various stakeholders are incorporated appropriately in the R25-C25 curriculum.

**The following improvements are suggested: (Action Points)**

1. External members suggested to create more awareness about IKS to the faculty members by conducting either department workshops or institute level workshops
2. External members suggested to incorporate more experiments that can help students to understand concepts easily in the lab component. (**Appendix - VII**)




**The following recommendations and approvals are made after the discussion:**

1. BoS Members approved the revised regulations, curriculum structure, syllabus, assessment schemes of B.Tech. programmes and it follows based on the NEP 2020.
2. Two common courses for the 1st year B. Tech bio stream (Applied physics) and non-bio streams (Engineering Physics) are approved.
3. Semiconductor physics and devices for 2nd year BM and Physics for quantum computing for 2nd year CSE-IoT are approved
4. The details of elective courses Thin film technology, Green energy technologies and Analytical techniques for engineers for B.Tech., 2nd year and 3rd year Programme for the regulation R25-C25 are approved. One open elective with title " quantum physics for next generation computing" is approved for B.Tech., 2nd year and 3rd year Programme for the regulation R22-C24 are approved with capstone project of 4 credits.
5. Minor program with the title of Fundamentals of Nano technology which contains four courses such as Electromagnetic theory, Quantum Mechanics, Lasers and Micro & Nano materials are approved for regulation R25-C25 with capstone project of 4 credits. Another minor program with title of Quantum Technologies with four courses such as Quantum Principles, Structures and Computing, Quantum Computing Theory & Practices, Quantum Computation & Applications, Quantum Algorithms & Cryptography for Quantum technologies with capstone project of 4 credits are approved for the regulations R22-C24.
6. SDG mapping and incorporation of the IKS components in the syllabus is approved.

There being no further points for discussion, the Chairperson thanks all the external, internal, invited members and announced that the meeting was concluded.

**Member Secretary**

**Chairperson**

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# DEPARTMENT OF PHYSICS

## APPENDIX I

### B. Tech Program: Curriculum Structure

**I Year I/II Semester Structure**

| S. No. | Course Code | Course Title | L | T | P | SL | C | Remarks | Course Offered By |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 25PYxx | Engineering Physics | 3 | - | 2 | 3 | 4 | Basic Sciences | S&H-Physics |
| 2. | 25PYxx | Applied Physics | 3 | - | 2 | 3 | 4 | Basic Sciences | S&H-Physics |
| | | **Total** | **6** | **0** | **4** | **6** | **8** | | |
| | | Contact Hours | 16 Hours | | | | | | |

**L=Lecture; T= Tutorial; P= Practical; SL= Self Learning; C=Credits**

**II Year I/II Semester Structure**

| S. No. | Course Code | Course Title | L | T | P | SL | C | Remarks | Course Offered By |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 25PYxx | Semiconductor physics and devices | 2 | - | 2 | 2 | 3 | Basic Sciences | S&H-Physics |
| 2 | 25PYxx | Physics for Quantum computing | 2 | 2 | 0 | 2 | 3 | Basic Sciences | S&H-Physics |
| | | **Total** | **4** | **2** | **2** | **4** | **6** | | |
| | | Contact Hours | 08 Hours | | | | | | |

**II. List of Minor Courses**

| S. No. | Course Code | Course Title | L | T | P | SL | C | Name of the Stream (If available) |
|---|---|---|---|---|---|---|---|---|
| 1. | 25PYxx | Electromagnetic theory | 2 | 2 | 0 | 2 | 3 | All B.Tech students of 2nd year |
| 2. | 25PYxx | Quantum Mechanics for Engineering | 2 | 2 | 0 | 2 | 3 | All B.Tech students of 2nd year |
| 3. | 25PYxx | Lasers | 2 | 2 | 0 | 2 | 3 | All B.Tech students of 3rd year |
| 4. | 25PYxx | Micro & Nano materials | 2 | 2 | 0 | 2 | 3 | All B.Tech students of 2nd year |
| 5. | 25PYxx | Quantum physics for | 2 | 0 | 2 | 2 | 3 | All B.Tech students of 2nd year |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | next generation computing | | | | | | |
| 6. | 24PYxx | Quantum Computing Theory & Practices | 2 | 0 | 2 | 2 | 3 | All B.Tech students of 2nd year |
| 7. | 24PYxx | Quantum Computation & Applications | 2 | 0 | 2 | 2 | 3 | All B.Tech students of 2nd year |
| 8. | 24PYxx | Quantum Algorithms & Cryptography for Quantum technologies. | 2 | 0 | 2 | 2 | 3 | All B.Tech students of 2nd year |

**IV. List of Open Elective Courses**

| S. No. | Course Code | Course Title | L | T | P | SL | C |
|---|---|---|---|---|---|---|---|
| 1. | 25PYxx | Thin film technology | 2 | 2 | 0 | 2 | 3 |
| 2. | 25PYxx | Green energy technologies | 2 | 2 | 0 | 2 | 3 |
| 3. | 25PYxx | Analytical Techniques For Characterization Of Materials | 2 | 2 | 0 | 2 | 3 |
| 4. | 25PYxx | Applied quantum physics : Concepts to computation | 2 | 0 | 2 | 2 | 3 |

**Member Secretary**

**Chairperson**

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# DEPARTMENT OF PHYSICS

## APPENDIX II

**List of Courses that Enables Employability or Entrepreneurship or Skill Development**

| S. No. | Course Code | Course Title | Year of Introduction | Employability / Entrepreneurship / Skill development |
|---|---|---|---|---|
| 1 | 25PYxxx | Engineering Physics | 2025 | **Skill Development:** To impart adequate knowledge in the domine of basic physics and problem-solving techniques for the program. |
| 2 | 25PYxxx | Applied Physics | 2025 | **Skill Development:** To impart adequate knowledge in the domine of basic physics and problem-solving techniques for the program. |
| 3 | 25PYxxx | Semiconductor physics and devices | 2025 | **Employability:** To learn and apply the semiconducting principles in the fabrication of devices for various applications. |
| 4 | 25PYxx | Physics for Quantum computing | 2025 | **Skill Development:** To impart adequate knowledge in the domine of quantum physics and problem-solving techniques for the program. |
| 5 | 25PYxxx | Thin film technology | 2025 | **Employability:** To learn and apply the growth and characterization of thin films for advanced applications like solar cells and lasers and led etc. |
| 6 | 25PYxxx | Green energy technologies | 2025 | **Employability:** To learn and apply green energy production and storage technologies for sustainable future. |
| 7 | 25pyxxx | Analytical Techniques For Characterization Of Materials | 2025 | **Employability:** To learn and apply analytical methods for the characterization of materials and thin films for various technologies. |
| 8 | 25PYxxx | Quantum physics for next generation computing | 2025 | **Skill Development:** To impart adequate knowledge in the domine of basic physics and problem-solving techniques for the quantum computation |
| 9 | 25PYxxx | Electromagnetic theory | 2025 | **Skill Development:** To impart adequate knowledge in the domine of electromagnetic theory and problem-solving techniques for the program. |
| 10 | 25PYxxx | Quantum Mechanics for Engineering | 2025 | **Skill Development:** To impart adequate knowledge in the domine of quantum mechanics and problem-solving techniques for the program. |
| 11 | 25PYxxx | Lasers | 2025 | **Skill Development:** To impart adequate knowledge in the domine of lasers and problem-solving techniques for the program. |
| 12 | 25PYxxx | Micro & Nano materials | 2025 | **Employability:** To learn about the growth of nano materials and micro materials for various applications in the field of medicine, semiconducting technology, industrial and domestic needs. |
| 13 | 25PYxxx | Quantum Principles, | 2025 | **Skill Development:** To impart adequate |

| | | | | |
|---|---|---|---|---|
| | | Structures and Computing | | knowledge in the domine of quantum mechanics and problem-solving techniques for the quantum computation. |
| 14 | 25PYxxx | Quantum Computing Theory & Practices | 2025 | **Skill Development:** To impart adequate knowledge theoretical concepts and necessary practical knowledge needed for quantum computing. |
| 15 | 25PYxxx | Quantum Computation & Applications | 2025 | **Skill Development:** To impart adequate knowledge of theoretical concepts and necessary practical knowledge needed for quantum computation and applications. |
| 16 | 25PYxxx | Quantum Algorithms & Cryptography | 2025 | **Employability:** To be able to compute the solutions for various problems in domine of chemical sciences, medicine, banking and financial transactions and cryptography using Quantum computation. |

**Member Secretary**

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VIGNAN'S

# DEPARTMENT OF PHYSICS

## APPENDIX III

### Comparison of Course Contents between R25-C25 and R22-C24 Curriculums

| S. No. | Course Code | Course Title | % of Changes | Justification for the changes |
|---|---|---|---|---|
| 1. | | Engineering Physics | 30% | Based on the industrial needs more semiconductor devices are added |
| 2. | | Applied Physics | 30% | Based on the feedback of alumni, fluid mechanics was added |
| 3. | | Thin film technology | 25% | To have more continuous and practical experience, turbo pumps were added with the suggestion of BOS members. |
| 4. | | Green energy technologies | 25% | Based on the industrial need's homo and hetero junction solar cells were added with industrial expert from BOS members (Dr. Y. Bharath Kumar Reddy) |
| 5. | | Analytical Techniques for Characterization of Materials | 25% | Based on suggestions given by BOS members |
| 6. | | Electromagnetic theory | 100% | Based on the present industry needs and feedback from students and alumni, we have introduced minor courses on the fundamentals of nanotechnology where EM radiation plays a significant role in understanding the light matter interaction. |
| 7. | | Quantum Mechanics for Engineering | 100% | Based on the present industry needs and feedback from students and alumni, we have introduced minor courses on the fundamentals of nanotechnology where quantum mechanics plays a key role in understanding the key concepts |
| 8. | | Lasers | 100% | Based on the present industry needs and feedback from students and alumni, we have introduced minor courses on the fundamentals of nanotechnology where lasers are important for various medical, commercial, industrial and defense related applications. |
| 9. | | Micro & Nano materials | 100% | Based on the present industry needs and feedback from students and alumni, we have |

| | | | | |
|---|---|---|---|---|
| | | | | introduced minor courses on the fundamentals of nanotechnology where micro and nano materials plays significant role as sensors. |

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Chairperson

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# DEPARTMENT OF PHYSICS

## APPENDIX IV

### List of New Courses in the R25-C25 Curriculum

| S. No. | Course Code | Course Title | % of Change | Justification for the Changes |
|---|---|---|---|---|
| 1. | | Semiconductor physics and devices | 100% | Based on the present industry needs and feedback from students and alumni, we have introduced a special course to give out lines of various semiconducting devices and their underlying physics. |
| 2. | | quantum physics for next generation computing | 100% | Based on the present industry needs and national quantum mission, we have introduced a special open elective course to give some basics about the quantum computing. |

Member Secretary

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# DEPARTMENT OF PHYSICS

## APPENDIX V

### I. Details of IKS Components Incorporated in R25-C25 Curriculum

| Course Type | Total number of Courses | Number of Courses Incorporating IKS | Percentage |
|---|---|---|---|
| Basic sciences | 4 | 4 | 80% |
| Professional Core | | | |
| Department Electives | | | |
| Open Electives | 3 | 3 | 80% |
| Minors | 4 | 4 | 80% |
| Honours | | | |
| **Total** | **11** | **11** | |

### II. List of Courses in the R25-C25 Curriculum Incorporating IKS

| S. No. | Course Code | Course Title | Type of course | Module (Unit) | IKS Components Incorporated |
|---|---|---|---|---|---|
| 1. | | Engineering Physics | Basic sciences | M1 (U1, U2) | Metallurgy in Ancient India – Study of Zinc distillation in Zawar, Iron Pillar of Delhi (rust resistance) and Philosophical parallels from Vedanta and Nyaya schools |
| | | | | M2 (U1, U2, U3) | Concepts of Panchabhuta (Five elements) and their material properties, Ancient Indian lighting techniques (oil lamps, mirrors) and sunlight-based architecture (temple alignments), Use of light and sound in Vedic rituals (Yajna), mirror systems in temples for illumination |
| 2. | | Applied Physics | Basic sciences | M1 (U1, U2) | Ancient Indian knowledge of fluid flow in Ayurveda and hydraulic systems, Philosophical ideas of atomism and wave-particle concepts from Vaisheshika and Nyaya schools |
| | | | | M2 (U1, U2, U3) | Traditional use of Bhasmas (metallic/mineral powders) in Ayurveda, Use of focused light and heat in ancient Indian surgical practices, Ancient Indian optics — Shulbasutras geometry and temple architecture with natural light management |
| 3. | | Semiconductor Physics and Devices | Basic sciences | M1 (U1, U2) | Ancient Indian knowledge of minerals and metallurgy (Rasa Shastra), |
| | | | | M2 (U1, U2, U3) | Analogies from Indian logic and system thinking (Nyaya philosophy) for control and switching |
| 4. | | Analytical Techniques for Characterization of Materials | Open elective | M1 (U1, U2) | Ancient Indian knowledge of light and optics from texts like Siddhanta Shiromani, Vedas |

| | | | | | |
|---|---|---|---|---|---|
| | | | | M2 (U1, U2, U3) | Indian philosophical ideas on atomic nature from Vaisheshika and Nyaya schools, Traditional Indian metallurgy and crystallography knowledge (e.g., wootz steel production), |
| 5. | | Green Energy Technologies | Open elective | M1 (U1, U2) | Ancient Indian understanding of earth's heat and energy cycles in texts like *Agni Purana* and *Bhagavad Gita* |
| | | | | M2 (U1, U2, U3) | *Surya Yantra, Jala Tatva* and elemental concepts |
| 6. | | Thin Film Technology | Open elective | M1 (U1, U2) | Ancient Indian use of bellows and airflow control in metallurgy and glass making |
| | | | | M2 (U1, U2, U3) | Natural deposition processes (e.g., formation of nacre layers in pearls or natural coatings on minerals) |
| 7. | | Electromagnetic Theory | Minor | M1 (U1, U2) | Concepts of *Agni*, *Prana*, and *Tejas* from *Vedic physics* relating to force fields and energy flows, Use of lodestone (natural magnetite) in ancient Indian navigational techniques; *Vaastu Shastra* orientation logic |
| | | | | M2 (U1, U2, U3) | Ancient Indian *Pancha Mahabhuta* theory for understanding media interaction (earth, water, fire, air, space), Connection to *Shabda Brahma* and *Nadabrahma* concepts in Vedic science about wave and sound propagation |
| 8. | | Quantum Mechanics for Engineering | Minor | M1 (U1, U2) | Cosmology and Atomic Philosophy (Shunya, Vaisesika, Logic and Inference (Nyaya-Vaisheshika |
| | | | | M2 (U1, U2, U3) | Rasayana and Material Science, Vedic Maths & Geometry, Vedantic Metaphysics (Advaita Vedanta) |
| 9. | | Laser science & technology | Minor | M1 (U1, U2) | Ancient optics and Vaisheshika Sutras |
| | | | | M2 (U1, U2, U3) | Traditional metal and gemstone treatment, Ethical frameworks in Indian philosophy |
| 10. | | Micro and nanomaterials | Minor | M1 (U1, U2) | Traditional Material Knowledge, Ayurveda and Nanomedicine |
| | | | | M2 (U1, U2, U3) | Sustainable Use of Natural Resources, Philosophy of 'Anu' and 'Paramanu' |

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VIGNAN'S

# DEPARTMENT OF PHYSICS

## APPENDIX VI

### I. Details of SDG Mapped Courses in R25-C25 Curriculum

| Course Type | Total number of Courses | Number of Courses Mapped with SDGs | Percentage |
|---|---|---|---|
| Basic Sciences | 4 | 4 | 80% |
| Professional Core | | | |
| Department Electives | | | |
| Open Electives | 4 | 3 | 80% |
| Minors | 8 | 4 | 50% |
| Honours | | | |
| Total | 16 | 11 | |

### II. List of R25-C25 Courses Mapped with SDGs along with Justification

| S. No. | Course Code | Course Title | Type of course | SDGs covered | Justification |
|---|---|---|---|---|---|
| 1. | | Engineering Physics | Basic sciences | 4 | Understanding fundamental physics concepts contributes to strong technical education, enabling students to apply analytical thinking in engineering problems. |
| | | | | 7 | Study of solar and LED technologies supports clean and sustainable energy systems |
| | | | | 9 | Understanding semiconductor behavior is foundational for electronics and modern industry |
| | | | | 11 | Optical fiber communication enables Sustainable Cities and Communities. |
| | | | | 12 | Semiconductors are foundational for electronics and modern industry |
| | | | | 13 | Practical understanding of energy generation, conversion, and conservation principles leads to clean energy and reduction in climate change. |

| | | | | | |
|---|---|---|---|---|---|
| 2. | | Applied Physics | Basic sciences | 3 | Understanding fluid flow relates to biological fluids, blood flow, and water systems vital for health and sanitation. |
| | | | | 4 | Understanding fundamental physics concepts contributes to strong technical education, enabling students to apply analytical thinking in engineering problems. |
| | | | | 9 | Quantum concepts underpin medical imaging technologies and novel biomedical devices. |
| | | | | 12 | Nanomaterials are foundational for modern medical and electronic industry |
| 3. | | Semiconductor Physics and Devices | Basic sciences | 4 | Understanding fundamental physics concepts contributes to strong technical education, enabling students to apply analytical thinking in engineering problems. |
| | | | | 7 | Rectifiers and voltage regulators essential for power electronics, supporting clean energy tech |
| | | | | 8 | Developing semiconducting based sensors and devices leads to Economic Growth |
| | | | | 9 | Semiconductor tech is core to electronics innovation and sustainable technology manufacturing |
| | | | | 12 | Semiconductors are foundational for the modern medical and electronic industry |
| 4. | | Analytical Techniques For Characterization Of Materials | Open Elective | 3 | Spectroscopic techniques are vital in medical diagnostics, pharma research, and materials science |
| | | | | 9 | Material characterization is key for sustainable industrial processes and innovation |
| | | | | 12 | Understanding materials' thermal properties supports efficient design and environmental safety |
| 5. | | Green Energy Technologies | Open Elective | 7 | Understanding geothermal energy contributes to the development of clean and sustainable energy sources, reducing reliance on fossil fuels and mitigating climate change |
| | | | | 9 | Analyzing batteries and supercapacitors enhances energy |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | storage solutions, fostering innovation in energy infrastructure and promoting efficient resource use. |
| | | | | 13 | Evaluating wind energy systems aids in the adoption of wind power, a clean energy source, thus contributing to climate change mitigation efforts. |
| 6. | | Thin Film Technology | Open Elective | 7 | **Affordable and Clean Energy** – Relevance of photonics and energy devices |
| | | | | 9 | Industry, Innovation, and Infrastructure — thin film tech is vital for electronics, sensors, renewable energy, and smart devices |
| | | | | 13 | Climate Action — thin films contribute to energy-efficient solar cells and sensors for environmental monitoring |
| 7. | | Electromagnetic Theory | Minor | 4 | Understanding fundamental physics concepts contributes to strong technical education, enabling students to apply analytical thinking in engineering problems. |
| | | | | 7 | Magnetostatics is foundational in the design of energy systems (e.g., inductors, transformers), essential for efficient and clean energy technologies. |
| | | | | 9 | Mastery of electromagnetic wave behavior supports innovation in green technologies (wireless transmission, smart grids), aligning with infrastructure development and environmental responsibility |
| | | | | 11 | Application of EM theory to communication and sensor systems fosters smart cities and sustainable urban planning with efficient energy and communication systems. |
| 8. | | Quantum Mechanics for Engineering | Minor | 4 | Deepens learners' understanding of modern quantum physics and its role in high-tech domains. |
| | | | | 9 | Builds foundational knowledge for future engineers working in nanotech, quantum devices, and secure computing. |

| | | | | | |
|---|---|---|---|---|---|
| | | | | 16 | Quantum cryptography as a foundation for ethical and secure digital systems. |
| 9. | | LASER SCIENCE & TECHNOLOGY | Minor | 3 | Laser applications in medicine (surgery, dermatology) enhance healthcare accessibility. |
| | | | | 4 | Gaining foundational knowledge supports lifelong learning in emerging photonic technologies |
| | | | | 7 | Semiconductor lasers contribute to efficient lighting and energy-saving technologies. |
| | | | | 9 | Understand lasing processes critical for innovative optoelectronics and communication devices. |
| | | | | 12 | Emphasis on safety and ethical applications of high-power lasers |
| 10. | | MICRO AND NANOMATERIALS | Minor | 3 | Promotes eco-friendly innovations in healthcare, defence, and environmental sectors |
| | | | | 4 | Promotes higher-order thinking and research orientation in quantum and nanoscale systems. |
| | | | | 7 | Supports fabrication of advanced materials for energy-efficient technologies |
| | | | | 9 | Understanding material science is foundational for innovation in nano/micro technologies. |
| | | | | 12 | Promotes efficient use of materials and sustainability in engineering design. |

## III. Mapping of R25-C25 Courses with individual SDGs

| SDG No. | SDG Name | No. of courses mapped | Percentage of courses mapped |
|---|---|---|---|
| 1 | No Poverty | | |
| 2 | Zero Hunger | | |
| 3 | Good Health and Well-Being | 4 | 80% |
| 4 | Quality Education | 7 | 80% |
| 5 | Gender Equality | | |
| 6 | Clean Water and Sanitation | | |
| 7 | Affordable and Clean Energy | 5 | 80% |
| 8 | Decent Work and Economic Growth | 1 | 80% |
| 9 | Industry, Innovation and Infrastructure | 9 | 80% |
| 10 | Reduced Inequalities | | |
| 11 | Sustainable Cities and Communities | 2 | 80% |
| 12 | Responsible Consumption and Production | 6 | 80% |
| 13 | Climate Action | 2 | 80% |

| | | | |
|---|---|---|---|
| 14 | Life Below Water | | |
| 15 | Life On Land | | |
| 16 | Peace, Justice and Strong Institutions | | |
| 17 | Partnerships for the Goals | 1 | 80% |
| | | | |

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# DEPARTMENT OF PHYSICS

## APPENDIX - VII

**Action Taken Report (ATR) on the suggestions given in earlier BoS meetings**

| S.No. | Action Point | Response |
|---|---|---|
| 1. | Difficulty of Quantum mechanics at the start of course. | We have shifted quantum mechanics from 1st unit to 2nd unit. So, it will give them some time to adjust and understand the need of quantum mechanics. |
| 2. | Lab practices | During the lab practices, the demonstration of experiment and connecting them directly with theriacal part of course. |

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