Bharati Vidyapeeth Deemed University

College of Engineering, Pune- 411043

The Structure of the Curriculum: 2015 Course

M. TECH. (NANOTECHNOLOGY):
SEMESTER- I & IV

Bharati Vidyapeeth University

College of Engineering, Pune

Department of Mechanical Engineering

Vision of the Bharati Vidyapeeth (Deemed to be University) College of Engineering is:

To be a World Class Institute for Social Transformation through Dynamic Education

Missions of the Bharati Vidyapeeth (Deemed to be University) College of Engineering are:

- *To provide quality technical education with advanced equipment, qualified faculty members, infrastructure to meet needs of profession & society.*
- *To provide an environment conducive to innovation, creativity, research and entrepreneurial leadership.*
- *To practice and promote professional ethics, transparency and accountability for social community, economic & environmental conditions.*

Goals of the Bharati Vidyapeeth (Deemed to be) University College of Engineering are:

- *Recruiting experienced faculty.*
- *Organizing faculty development programs.*
- *Identifying socio-economically relevant areas & emerging technologies.*
- *Constant review &up gradation of curricula.*
- *Up gradation of laboratories, library & communication facilities.*
- *Collaboration with industry and research & development organizations.*
- *Sharing of knowledge, infra-structure and resources.*
- *Training, extension, testing and consultancy services.*
- *Promoting interdisciplinary research.*

Vision of the Mechanical Engineering Department is:

To develop, high quality Mechanical Engineers through dynamic education to meet social and global challenges.

Mission Statements of the Mechanical Engineering Department are:

- *To provide extensive theoretical and practical knowledge to the students with well-equipped laboratories and ICT tools through motivated faculty members.*
- *To inculcate aptitude for research, innovation and entrepreneurial qualities in students.*
- *To acquaint students with ethical, social and professional responsibilities to adapt to the demands of working environment.*

Program Educational Objectives (PEOs) of the B. Tech. Mechanical are:

Graduates will be able,

- *To fulfill need of industry and society with theoretical and practical knowledge.*
- *To engage in research, innovation, lifelong learning and continued professional development.*
- *To fulfill professional ethics and social responsibilities.*

PROGRAM OUTCOMES

Engineering Graduates will be able to:

1. ***Engineering knowledge****: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.*

2. ***Problem analysis****: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.*

3. ***Design/development of solutions****: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.*

4. ***Conduct investigations of complex problems****: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.*

5. ***Modern tool usage****: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.*

6. ***The engineer and society****: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.*

7. ***Environment and sustainability****: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.*

8. ***Ethics****: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.*

9. ***Individual and team work****: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.*

10. ***Communication****: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.*

11. ***Project management and finance****: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.*

12. Life-long learning*: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.*

Statements of Programme Specific Outcomes (PSOs)

PSO1: Apply the knowledge of thermal, design, manufacturing engineering and computational sciences to solve Mechanical Engineering problems.

PSO2: Apply Mechanical Engineering principles for research, innovation and develop entrepreneurial skills.

PSO3: Apply concepts of mechanical engineering to asses' societal, environmental, health and safety issues with professional ethics.

Rules for Conducting Tests

Mode of the test

- In each semester for each subject two tests shall be conducted. The schedule for the same willbe declared at the commencement of academic year in the academic calendar.
- Each test shall carry 20 marks.
- University examination pattern has given weightage of 20 marks for the tests.

- To calculate these marks following procedure is followed:

  i) Average marks obtained in two tests shall be considered as provisional marks obtained by the student in the tests.

  ii) If the candidate appears only for one test during the semester, to calculate the marks obtained in the tests it will be considered that the candidate has got 0 (zero) marks in othertest.

  iii) The provisional marks obtained by the candidate in class tests should reflect as proportional to theory marks. In cases of disparity of more than 15% it will be scaled down accordingly; these marks will be final marks obtained by the student. No scaling up is permitted.

  iv) If the candidate is absent for theory examination or fails in theory examination his final marks for tests of that subject will not be declared. After the candidate clears the theory, the provisional marks will be finalized as above.

  - Paper pattern for tests

    i) All questions will be compulsory with weightage as following

    Question 1 - 7 marks

    Question 2 - 7 marks

    Question 3 - 6 Marks

    ii) There will not be any sub-questions.

  - For granting the term it is mandatory to appear for both tests conducted in each semester.
  - Roll nos. allotted to students shall be the examination nos. for the tests.

Structure of M.Tech (Nano Technology)

Based on Credit Pattern

STRUCTURE & EXAMINATION PATTERN

Semester I											**Total Duration : 20hrs/week** **Total Marks : 500** **Total Credits : 18**
Subjects	Teaching Scheme (Hrs) Hrs./Week		Examination Scheme (Marks)						Examination Scheme (Credits)		Total Credits
	L	P	Theory	Unit Test	Attend ance	Tutorial/ Assignments	TW	Pract/ Oral	TH	TW/PR /OR	
Nanoscience& Nanotechnology	04	02	60	20	10	10	25	25	04	01	05
Nano-Physics	04	--	60	20	10	10	--	--	04	--	04
Nano-Chemistry	04	--	60	20	10	10	--	--	04	--	04
Nano-Biology	04	02	60	20	10	10	25	25	04	01	05
Total	**16**	**04**	**240**	**80**	**40**	**40**	**50**	**50**	**16**	**02**	**18**

Semester II									**Total Duration : 20hrs/week** **Total Marks : 500** **Total Credits : 18**		
Subjects	Teaching Scheme (Hrs) Hrs./Week		Examination Scheme (Marks)						Examination Scheme (Credits)		Total Credits
	L	P	Theory	Unit Test	Attend ance	Tutorial/ Assignments	TW	Pract/ Oral	TH	TW/PR/ OR	
Nano-Computing	04	--	60	20	10	10	--	--	04	--	04
Nano Fabrication and Advanced Synthesis Technology	04	02	60	20	10	10	25	25	04	01	05
Nano Characterization	04	02	60	20	10	10	25	25	04	01	05
Energy, Environment, Safety and Commercialization for Nanotechnology	04	--	60	20	10	10	--	--	04	--	04
Total	**16**	**04**	**240**	**80**	**40**	**40**	**50**	**50**	**16**	**02**	**18**

Semester III									**Total Duration : 28hrs/week** **Total Marks : 475** **Total Credits : 40**		
Subjects	Teaching Scheme (Hrs) Hrs./Week		Examination Scheme						Examination Scheme (Credits)		Total Credits
	L	P	Theory	Unit Test	Attendance	Tutorial/ Assignments	TW	Pract/ Oral	TH	TW/PR/ OR	
Elective –I	04	02	60	20	10	10	25	25	04	01	05
Elective –II	04	02	60	20	10	10	25	25	04	01	05
**Self Study Paper – I	*04	--	60	20	10	10	--	--	04	--	04
Dissertation Stage - I	--	07	--	--	--	--	25	--	--	21	21
Seminar	--	05	--	--	--	--	25	25	--	05	05
Total	**12**	**16**	**180**	**60**	**30**	**30**	**100**	**75**	**12**	**28**	**40**

ELECTIVE I:	**ELECTIVE II:**
• Computational Nanoscience • Nano Electronics • Nano Medicine • Nano Engineered Devices	• Nano Photonics • Industrial Nanotechnology • Nano Material Science • Nano Composites

Semester IV									**Total Duration : 14 hrs/week** **Total Marks : 325** **Total Credits : 34**		
Subjects	Teaching Scheme (Hrs) Hrs./Week		Examination Scheme (Marks)						Examination Scheme (Credits)		Total Credits
	L	P	Theory	Unit Test	Attendance	Tutorial/ Assignments	TW	Pract/ Oral	TH	TW/PR/ OR	
**Self Study Paper – II	*04	--	60	20	10	10	--	--	04	--	04
Dissertation Stage-II	00	10	--	--	--	--	150	75	--	30	30
Total	**04**	**10**	**60**	**20**	**10**	**10**	**150**	**75**	**04**	**30**	**34**

Sr.No.	SELF STUDY PAPER- I (SEM-III)	SELF STUDY PAPER- II (SEM-IV)
1	Modeling and Simulation of Nanosystems	Silicon Nanostructures & Carbon Nanotubes Based Nanoelectronics
2	Synthesis and Design Nanoscale Products	Nanobioelectronics
3.	Applications of Nanotechnology in Food and Agriculture	Compound Semiconductor Materials And Devices
4	Finite Element Methods for Nanoscale Structures	Nanoprocessing
5	MEMES/NEMES	Introduction To Nano-modelling