Date: 10th August, 2022

SDM college of Engineering and Technology, Dharwad

Proceedings of Meeting of BOS (Basic Science and Humanities) held on 10th August, 2022 at 10.30 AM in the College Board room.

The Chairman extended welcome to all the members and introduced the newly appointed external members for the academic years April 2022-2025. Dr. K. Gopinath, Principal, SDMCET made initial remarks. Dr. R. L. Chakrasali, Dean Academic Programme, briefed about the autonomous status of our college, implementation of few subjects according to NEP, Scheme of Ist year and discussed regarding revision of syllabi of Physics, Chemistry, Mathematics and Humanity subjects for academic year 2022-2025. Further, sir suggested to modify the syllabus as per the institutional requirement and students prospective.

The External BOS members of all the three departments, i.e., (Physics, Chemistry, Mathematics), have gone through all the framed syllabi in detail and meticulously discussed the contents in the meeting. They have suggested valuable changes in the existing syllabi and highlighted the necessity of changing the contents. Accordingly entire syllabi of all the subjects are revised. The details of resolutions accepted are as follows:

1. The proposed syllabus (with 10% relevant changes) of Physics for 1st and 2nd semesters B.E. for theory and lab was resolved to accept.
   The proposed syllabus (about 5-10 % relevant changes in existing syllabus) of open elective Nano-Technology for 8th semesters B.E. was resolved to accept.

2. The proposed syllabus (with 10% relevant changes) of Chemistry for 1st and 2nd semesters B.E. for theory was resolved to accept.
   The proposed syllabus (with relevant changes) of Chemistry for 1st and 2nd semesters B.E. for Lab was resolved to accept.

3. The proposed syllabus of Kannada, English, Society, Environment and Engineering, Biology for Engineers, Cyber Law, Universal Human Values-1&2 and Constitution of India and Professional Ethics with relevant changes were resolved to accept.

4. The proposed syllabi of Mathematics for 1st and 2nd semesters B.E., Engineering Mathematics –IV and Applied Mathematics (Open Elective) were resolved to accept as it is. The modification to 5% in the syllabi of Engineering Mathematics-III (21UMAC300) and Numerical Techniques for Engineers (21UAEE100/200) was resolved to accept.

Syllabi for Mathematics (Bridge course) for III and IV semester lateral entry students were framed with respective course codes (21UMBA301- & 21UMBA401) was resolved to accept.

As per the requirement of the departments, branch-specific syllabi are framed for the following subjects and were resolved to accept.

(i) Engineering mathematics-III (21UCSM300)
(ii) Engineering mathematics-IV (21UCSM400)
(iii) Engineering mathematics-III (21UECM300)
(iv) Engineering mathematics-IV (21UECM400)
(v) Engineering mathematics-III (21UISM300)
(vi) Engineering mathematics-IV (21UISM400).

No changes were made in I semester PG syllabi for the following subjects:

(i) Applied Mathematics-22PDEC100 (M.Tech in Digital Electronic)

(ii) Applied Mathematics-22PEPC100 (M.Tech in Electrical Power system)

(iii) Computational Methods in Engineering-22PEAC100 (M.Tech in Engineering Analysis and Design).

The change to 5% in Mathematics 22PCSC100-(M.Tech in computer science and engineering).

For Computer Science department, as per the department requirement Branch-specific syllabi are framed for the following subjects and were resolved to accept.

(i) Applied Mathematics- 22PCDC100-(M.Tech in Computer Aided Design of structures).

(ii) Advanced Mathematics -22PITC100 - (M.Tech in Information Technology.

The meeting ended with a vote of thanks by Dr. P. V. Raghavendra, Member Secretary, BOS, Basic Science and Humanities.

Members Present

VTU Nominees:

1. Dr. H. P. Patil, Professor& Head, Department of Mathematics, SIT Tumukar. 10/8/2022

Subject Experts External:

1. Dr. M. K. Rendale, Professor& Head, Dept. of Physics, KLS Gogate Institute Technology, Belagavi.
2. Dr. R. M. Kulkarni, Professor Head, Department of Chemistry, KLS Gogate Institute Technology, Belagavi.

3.

Internal Members:

1. Dr. Jenifer K., HOD, Dept of Mathematics, SDMCET, Dharwad.
2. Dr. K. I. Maddani, HOD, Dept. of Physics, SDMCET, Dharwad.
3. Dr. Shashikant Kurodi, HOD, Dept. of Humanities, SDMCET, Dharwad
4. Dr. D. P. Basti, Professor, Dept of Mathematics, SDMCET, Dharwad.
5. Dr. N. Shashidhar, Associate Professor, Dept of Chemistry, SDMCET, Dharwad.
6. Dr. P. V. Raghavendra, Assistant Professor, Dept of Physics, SDMCET, Dharwad. 10/8/22
7. Faculty of Basic Sciences and Humanities.

Dr. A.A. Kittur,
Chairman BOS,
Basic Science and Humanities

21UPHC100/200	Engineering Physics	(3-0-0)3Credits

Contact Hours: 39, CIE: 50 Marks SEE: 100 Marks, Exam Duration: 3 Hrs.

Course Learning Objectives (CLOs):

Engineering Physics course is designed to deliver optimum knowledge of materials and energy concepts. Content explores the fundamental theories, experimental demonstrations and their applications in various engineering fields. Scope of the curriculum includes the study of special theory of relativity, quantum mechanics, electrical properties of materials and photonics.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1 to 12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explore the basics of theory of relativity and their significance in understanding material properties.	2	1	
CO-2	Demonstrate the concept of dual natures of energy and matter, one-dimensional wave equation and its relevance in understanding quantum structures.	1	2	
CO-3	Understand the electrical properties of metals and superconductors for engineering applications.	1	2	
CO-4	Elaborate the behavior of material at nano-size and concept of semiconductors, which supports for their applications.	1	2	
CO-5	Discuss the optical phenomena *vis a vis* interaction of radiation with matter, lasing action and the basics of optical fibers and their applications.	2	1	

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level	2.83	1.8										

Prerequisites: Nil

Dr. K. I. Maddasi

Dr. P. V. Raghavendra

(Dr. M. K. Rendale)

Contents:

Unit I

Theory of Relativity

Classical theory of relativity-Frames of reference (Inertial and Non-inertial) and Galilean transformations. Michelson-Morley experiment, Postulates of Special theory of relativity, Lorentz transformations. Consequences of Lorentz transformations-length contraction, time dilation (twin paradox) and addition of velocities. Relativistic mass and mass- energy equivalence (qualitative). Numerical examples.

7 Hrs.

Unit II

Quantum Mechanics

Introduction to quantum mechanics, de-Broglie hypothesis, Davisson-Germer's experiment. Concept of phase velocity, group velocity and particle velocity (qualitative).Relation between group velocity and particle velocity. Application of de-Broglie hypothesis. Heisenberg's uncertainty principle and applications. Wave function, properties and physical significance of a wave function. Normalization of wave function, setting up of 1-dimensional time independent Schrödinger wave equation. Applications of Schrödinger wave equation – (a) Energy Eigen values (b) Eigen functions of a particle in a one-dimensional potential well of infinite height and c) free particle. Numerical examples.

8 Hrs.

Unit III

Quantum theory of Conductivity

Conductors: Review of classical free electron theory- Assumptions and failures. Quantum free electron theory (QFET) – assumptions, Distribution of electrons, Fermi level, Fermi energy, Fermi velocity, Fermi temperature, concept of density of states (in bulk), Fermi-Dirac statistics- Dependence of fermi factor and Occupation of density of states on temperature. Expression for electrical conductivity, success of QFET. Numerical examples.

Superconductors: Appearance of residual resistivity in typical metal – Concept of zero resistivity and superconductivity – critical temperature, persistent current, BCS theory. Meissner effect, Critical field, Soft and Hard superconductors, Applications.

8 Hrs.

Dr. K. I. Maddaoji

(Dr. M. K. Rendale)

Dr. P. V. Raghavendra

Unit IV

Materials Science

Semiconductors: Direct and indirect band gap semiconductors, Fermi level in semiconductor, carrier concentration and electrical conductivity in semiconductors (qualitative). Hall effect–determination of Hall voltage and Hall coefficient. Numerical examples.

Nanomaterials: Introduction, size dependent properties of nanomaterials, classification – based on electron confinement, variation of DOS. Syntheses of nanomaterials by top down and bottom up approaches (one example for each). Characterization techniques (qualitative). Carbon nanostructures-Graphene, fullerene and CNTs. Applications of nanomaterials- Super-capacitors, LED and Solar cells.

8 Hrs.

Unit V

Photonics

Laser: Basics of light amplification, Einstein's coefficients (expression for energy density), principle and operation of CO_2 and semiconductor diode laser. Applications - LIDAR, laser cooling, laser fusion.

Optical Fiber: Principles of optical fiber (total internal reflection), Angle of acceptance, Numerical aperture, Fractional Index change, V-number and Modes of propagation. Types of Optical fibers, Attenuation co-efficient and fiber losses (qualitative). Numerical examples.

8 Hrs.

Question Paper Pattern:

1) Each question will carry 20 marks with maximum of four sub divisions.
2) Each unit will consists of two full questions
3) Students have to answer one full question from each unit and total five questions to be answered.
4) The question paper will have built in choice in the unit.

Reference Books:

1) Text book of Engineering Physics by Avadhanalu and Kshirasagar, S. Chand Publishers.
2) Modern Physics by Kenneth S. Krane, 3rd Edition, John Wiley & Sons Publishers
3) Elementary Solid State Physics by M. Ali Omar, Addison-Wesley Publishers

Dr. K. I Maddasi

Dr. A V. Raghavendra

(Dr. M. K. Rondale)

4) Introduction to Nanotechnology by C. P. Poole - John Wiley & Sons Publishers
5) Nanotechnology: Principles and Practices by Sulabha K Kulkarni, 3 rd Edition, Springer Publishers

Dr. K. I. Maddasi

(Dr. M. K. Rondale)

Dr. I. V. Raghavendra

18UPHE876	Nanotechnology	(3-0-0)3Credits

Contact Hours:39, CIE:50Marks, SEE:100 Marks, Exam Duration:3 Hrs.

Course Learning Objectives (CLOs):

The students are expected to learn about the fundamentals and multidisciplinary nature of nanotechnology and to understand the advantages of nanomaterials to bring novelty in the devices. The student learns the size and shape dependent properties, classification of nanomaterials, different methods to prepare nanostructures including hybrid fabrication approaches and characterization techniques. Finally, they are expected to be acquainted with the significance of nanomaterials.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1,12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Understand the basics of nanoscience and nanostructures	2	1	
CO-2	Elaborate the various synthesis methods of nanostructures	1	2	
CO-3	Understand to the construction and working principle of a broader range of characterization techniques.	1	2	
CO-4	Realize the carbon clusters and nanocomposites for device applications	1	2	
CO-5	Outline theapplication of nanomaterials	2	1	

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level	2.6	2.4										

Prerequisites: Nil

Dr. K. E. Maddaiah (Dr. R. M. Kulkarni) (Dr. M. K. Rendale) [illegible]

Contents:

Unit I

Basics of Nanoscale Materials: Wave particle duality, Quantum size effect- Schrödinger wave equation, Particle in box problem, Formation of bands in solids, Density of states. Introduction to nanoscale materials and their classification. Size dependent properties of Nano materials- Physical, electrical optical and magnetic properties.

8Hrs.

Unit II

Synthesis of Nanostructured materials: Top-down and Bottom-up approaches of synthesis of nanomaterials, Top down approach –Ball Milling, Nanolithography-photo, electron beam and dip pen lithography.

Bottom up approach –Sol gel methods, Chemical vapour deposition (CVD), solvothermal synthesis, Spin coating and spray pyrolysis. Sputtering, laser ablation, molecular beam epitaxy.

8 Hrs.

Unit III

Characterization techniques: Principle and working of Powder XRD technique, Scherrer equation, Construction and working principle of Optical spectroscopy (UV-VIS, DRS, photoluminescence spectroscopy), Electron microscopy - scanning electron microscopy, Scanning Tunneling Microscopy, transmission electron microscopy (TEM),EDAX.

7 Hrs.

Unit IV

Carbon nano structures and Nanocomposites: Carbon clusters: Fullerenes (Buckminister fullerene), grapheme – Synthesis by Electro chemical exfoliation, properties. Carbon nanotubes –classification, Synthesis, Properties and their applications.

Nanocomposites: Introduction, Ceramic andpolymer-based nano-composites, grapheme, carbon nanotube and metal-matrixfillers, Properties and applications of nano-composites.

8 Hrs.

Dr. K. L. Maddani (Dr. R. M. Kulkarni) (Dr. M. K. Kerudi) [Dr P. V. Raghavendra]

Unit V

Applications of Nanomaterials: Optoelectronic applications-Hybrid solar cells, QLED, nano-sensors. Photo-catalysis, Fuel cells, nanofluids, electrochemical energy storage systems, spintronics, Super Capacitors. Applications in medical field (drug delivery), food processing andagriculture.

8 Hrs.

Reference Books:

1) Sulabha K Kulkarni, Nanotechnology-Principles and Practices, Capital Publishing Company, 2007.
2) T. Pradeep, Nano: The Essentials, Tata McGraw Hill Education Pvt Ltd., 2013.
3) James Murday, Textbook of Nano-science and Nanotechnology, University Press-IIM, 2012.
4) Charles. P. Poole and F. J. Owens, Introduction to Nanotechnology, John Wiley & Sons Inc., 2003.
5) P. Mukhopadhyay and R. K. Gupta, Graphite, Graphene and their polymer Nanocomposites. CRC Press, Taylor & Francis Group. 2012.

Dr. K. I. Madaloor (Dr. K.M. Kaltari) (Dr. M.K. Kendale) [Dr. P.V. Rashmi]

ENGINEERING PHYSICS LABORATORY

21UPHL100/200 (2 – 0 – 0) 1 Credits

Course Objectives:

Engineering Physics laboratory course provides real time experience in handling equipments and measurement techniques. Experiments are designed to learn the material characterization techniques and realization of material properties. Basic objective of the course is to learn the experimental procedure and execution expertise in engineering practices.

Course outcome: Upon the completion of the course, the student should be able to

COs	Description of the course outcomes	Mapping to Pos (1-12)		
		Mastering 3	Moderate 2	Introductory 1
CO-1	Demonstrate the procedural preparation skill to conduct the experiment	1	2	
CO-2	Ability to perform the experiment and tabulate the observations made.	1	2	
CO-3	Skill to obtain an expected experimental out-comes by different techniques.	1	2	
CO-4	Interpretation of experimental results and conclusions.		1	2
CO-5	Articulation of the relevant theory.	1		2
Pos-		PO-1		PO-2
Mapping Level		2.8		1.6

Dr. K. I. Maddasi

(Dr. M. K. Rondale)

[Dr. P. V. Raghavendra]

Content:

1) Determination of the value of Young's modulus of the given wooden bar by single cantilever method.
2) Study of Photocell and determination of the Plank's constant.
3) To study the frequency response of series and parallel LCR circuits.
4) Determination of the Fermi Energy of a given metal.
5) Verification of Stefan-Boltzmann's Law by electrical method.
6) Determination of the energy gap of a given semiconductor.
7) Determination of numerical aperture and acceptance angle of an optical fiber.
8) Determination of the dielectric constant of a dielectric material by charging & discharging method.
9) Study of the characteristics of a given laser source using diffraction method.
10) Determination of resistivity of semiconductor using Four Probe method.
11) Study of Basic and Universal Logic gates.
12) Study of transistor characteristics.

Note: Minimum ten experiments are to be performed to complete the course.

References:

Edward R. Shaw, "**Physics by Experiment**", Create Space Independent Publishing Platform, 2014.

Dr. K. I. Maddasi

(Dr. M. K. Reendale)

[Dr. P. V. Raghavendra]