RV College of Engineering, Bangalore

BOS CONTENT SHEET - BASIC SCIENCES

NEW COURSES COMMON TO ALL PROGRAMS

(2018-2023)

The following are the new courses added in the curricula in the respective curricular revisions made in 2018, 2021 and 2022 schemes. Curricular revisions were discussed thoroughly at the respective Board of Studies meetings. The new courses added are reflected in the revised curricula with the course codes.

Sl. No.	Title of the new course added	Course code	Scheme in which the new course is added
1.	Engineering Physics	18PHY12/22	2018
2.	Engineering Chemistry	18CH12/22	2018
3.	Engineering Mathematics-I	18MA11	2018
4.	Engineering Mathematics-II	18MA21	2018
5.	Elements of Engineering Practices	18EE15	2018
6.	The Joy of Computing with Python	18CS5A5	2018
7.	Fundamentals of Aerospace Engineering	18G5B01	2018
8.	Nanotechnology	18G5B02	2018
9.	Fuel Cell Technology	18G5B03	2018
10.	Intelligent Systems	18G5B04	2018
11.	Remote Sensing and Geographic Information System	18G5B05	2018
12.	Automotive Electronics	18G5B06	2018
13.	e-Mobility	18G5B07	2018
14.	Smart Sensors & Instrumentation	18G5B08	2018
15.	Operations Research	18G5B09	2018
16.	Management Information Systems	18G5B10	2018
17.	Automotive Mechatronics	18G5B11	2018
18.	Telecommunication systems	18G5B12	2018
19.	Quantum Mechanics of Hetero/Nano Structures	18G5B13	2018
20.	Thin Films and Nanotechnology	18G5B14	2018
21.	Advances in corrosion science and technology	18G5B15	2018
22.	Computational Advanced Numerical Methods	18G5B16	2018
23.	Mathematics to Machine Learning	18G5B17	2018
24.	Engineering Economy	18G5B18	2018
25.	Aircraft Systems	18G6E01	2018
26.	Bio Inspired Engineering	18G6E02	2018
27.	Sustainable Technology	18G6E03	2018
28.	Graph Theory	18G6E04	2018
29.	Disaster Management	18G6E05	2018

30.	Wearable Electronics	18G6E06	2018
31.	Energy Auditing and Management	18G6E07	2018
32.	Virtual Instrumentation & Applications	18G6E08	2018
33.	Systems Engineering	18G6E09	2018
34.	Introduction To Mobile Application Development	18G6E10	2018
35.	Industrial Automation	18G6E11	2018
36.	Mobile Network System And Standards	18G6E12	2018
37.	Thin Film Nano Device Fabrication Technology	18G6E13	2018
38.	Chemistry of advanced energy storage devices for E-Mobility	18G6E14	2018
39.	Advanced Statistical Methods	18G6E15	2018
40.	Mathematical Modelling	18G6E16	2018
41.	Foundational course in Entrepreneurship	18G6E17	2018
42.	Unmanned Aerial Vehicles	18G7H01	2018
43.	Bioinformatics	18G7H02	2018
44.	Industrial Safety And Risk Management	18G7H03	2018
45.	Web Programming	18G7H04	2018
46.	Solid Waste Management And Statutory Rules	18G7H05	2018
47.	Image Processing And Machine Learning	18G7H06	2018
48.	Renewable Energy Sources And Storage System	18G7H07	2018
49.	MEMS & Applications	18G7H08	2018
50.	Project Management	18G7H09	2018
51.	Cyber Forensics And Digital Investigations	18G7H10	2018
52.	Robotics And Automation	18G7H11	2018
53.	Space Technology And Applications	18G7H12	2018
54.	Introduction To Astrophysics	18G7H13	2018
55.	Materials For Advanced Technology And Spectroscopic Characterization	18G7H14	2018
56.	Applied Psychology For Engineers	18G7H15	2018
57.	Advanced Course In Entrepreneurship	18G7H16	2018
58.	Business Analytics	18CS2G01	2018
59.	Industrial & Occupational Health and Safety	18CV2G02	2018
60.	Modeling using Linear Programming	18IM2G03	2018
61.	Project Management	18IM2G04	2018
62.	Energy Management	18CH2G05	2018
63.	Industry 4.0	18ME2G06	2018
64.	Advanced Materials	18ME2G07	2018

65.	Composite Materials Science and Engineering	18CHY2G08	2018
66.	Physics of Materials	18PHY2G09	2018
67.	Advanced Statistical Methods	18MAT2G10	2018
68.	Multivariable Calculus	21MA11	2021
69.	Engineering Mechanics	21CV14/24	2021
70.	IDEA Lab	21ME15/25	2021
71.	Differential Equations & Numerical Methods	21MA21	2021
72.	Summer Internship- I	21ETI310	2021
73.	Fundamentals of Linear Algebra, Calculus And Numerical Methods	22MA11A	2022
74.	Fundamentals of Linear Algebra, Calculus And Differential Equations	22MA11B	2022
75.	Fundamentals of Linear Algebra, Calculus And Statistics	22MA11C	2022
76.	Applied Mathematics in I	22MA11D	2022
77.	Vector Calculus, Laplace Transform And Numerical Methods	22MA21A	2022
78.	Vector Calculus And Computational Methods	22MA21B	2022
79.	Number Theory, Vector Calculus And Computational Methods	22MA21C	2022
80.	Applied Mathematics in II	22MA21D	2022
81.	Condensed Matter Physics For Engineers	22PHY12A	2022
82.	Classical Physics For Engineers	22PHY12B	2022
83.	Quantum Physics For Engineers	22PHY12C	2022
84.	Applied Physics For Engineers	22PHY12D	2022
85.	Chemistry of Smart Materials And Devices	22CHY12A	2022
86.	Engineering And Environmental Chemistry	22CHY12B	2022
87.	Chemistry of Functional Materials	22CHY12C	2022
88.	Chemistry of Engineering Materials	22CHY12D	2022
89.	Basic Electronics	22EC13	2022
90.	Introduction to Python Programming	22PL15A/25A	2022
91.	Introduction to Web Programming	22PL15B/25B	2022
92.	Basics to Java Programming	22PL15C/25C	2022
93.	Introduction to C++ Programming	22PL15D/25D	2022
94.	Introduction to Internet of Things	22EM101/201	2022
95.	Introduction to Drone Technology	22EM102/202	2022
96.	Bioinspired Engineering	22EM103/203	2022
97.	Global Climate Change	22EM104/204	2022
98.	Elements of Blockchain Technology	22EM105/205	2022
99.	Introduction to Cyber Security	22EM106/206	2022
100.	Green Buildings	22EM107/207	2022

101.	Infrastructure For Smart Cities	22EM108/208	2022
102.	Fundamentals of Nanoscience and Technology	22EM109/209	2022
103.	Fundamentals of Semiconductor Devices	22EM110/210	2022
104.	Introduction to Embedded Systems	22EM111/211	2022
105.	Renewable Energy Sources	22EM112/212	2022
106.	Fundamentals of Sensor Technology	22EM113/213	2022
107.	Human Factors in Engineering	22EM114/214	2022
108.	Digital Humanities	22EM115/215	2022
109.	Smart Materials and Systems	22EM116/216	2022
110.	Elements of Industry 4.0	22EM117/217	2022
111.	Bioinspired Engineering	22BT2D01T	2022
112.	Health Informatics	22BT2D02T	2022
113.	Intelligent Transportation Systems	22CV2D05T	2022
114.	Electronic System Design	22EC2D06T	2022
115.	Evolution of Wireless Technologies	22EC2D07T	2022
116.	Tracking and Navigation Systems	22ET2D08T	2022
117.	Database and Information Systems	22IS2D10T	2022
118.	Management Information Systems	22IS2D11T	2022
119.	Statistical and Optimization Methods	22MAT2D12T	2022

DEAN ACADEMICS

DEAN ACADEMICS
R.V. College of Engineering
Bengaluru - 560 059

PRINCIPAL

PRINCIPAL
R.V. College of Engineering
Bengaluru - 560 059

16th BoS Meeting

R.V. COLLEGE OF ENGINEERING
Mysuru Road, Bangalore - 560059.
(An Autonomous Institution under VTU, Belgaum)

DEPARTMENT OF PHYSICS

Ref: RVE/PHY/……../2017-18 **Date:** 20.02.2018

MEETING NOTICE

Dear Sir/Madam,

Sub: Board of studies in Engineering Physics-Academic Progress-reg.

Meeting of the Board of Studies (BOS) in Engineering Physics is scheduled on 20.02.2018 at 09.30 A.M. in the Department of Physics to discuss the Academic progress . Please make it convenient to attend the meeting.

Meeting Agenda:

No 29 1) Modification in the scheme of valuation of lab for CIE.
No 30 2) Supply of Course material through Quiklrn app.
No 31 3) Conduction of online quiz
No 32 4) Plan to introduce open software based simulation lab experiments.

Sl. No.	NAME OF THE BoS MEMBERS	SIGNATURE
01	Dr. R.Chandramani, Prof. of Physics, Dayananda Sagar College of Engineering, Bangalore.	—
02	Dr.R.V.Iyer, Professor, Dept. of Physics, P.E.S.University, Bangalore	R Vasudevan
03	Dr.K.B.Vijaya Kumar, Professor & Chairman, Mangalore University, Mangalore.	
04	Mr.Alok Shankar, Senior Manufacturing Engineer, U.T.C Space System (Boeing cell) Bangalore (AERO)	
05	Dr.T.Bhuvaneswara Babu, Chairman, BOS, Prof. & Head, Dept.of Physics, R.V.College of Engineering, Bangalore.	
06	Dr.D.N.Avadhani, Associate Professor, Dept.of Physics, R.V.College of Engineering, Bangalore.	
07	Dr.T.K.Subramanyam, Associate Professor, Dept.of Physics, R.V.College of Engineering, Bangalore.	—
08	Smt. Sudha Kamath M.K, Assistant Professor, Dept.of Physics, R.V.College of Engineering, Bangalore	Sudha Kamath
09	Dr. G.Shireesha, Assistant Professor, Dept.of Physics, R.V.College of Engineering, Bangalore.	G. Shireesha
10	Smt. S.Shubha, Assistant Professor, Dept.of Physics, R.V.College of Engineering, Bangalore.	Shubha

Dr.T.Bhuvaneswara Babu
Chairman BOS (Science)

R. V. COLLEGE OF ENGINEERING,

Mysuru Road, Bengaluru – 560 059

(An autonomous Institution Affiliated to VTU, Belgaum)

BOARD OF STUDIES IN ENGINEERING PHYSICS

Ref: RVE/PHY/...../2017-18 Date: 20.02.2018

Signature of the BoS Members present:

EXTERNAL MEMBERS

Structure	Name of the Member	Signature
Subject Experts from outside the college nominated by Academic Council.(2)	Dr. R.Chandramani Prof. of Physics, Dayanandasagar College of Engineering. Bangalore	ABSENT
	Dr.R.Vasudevan Iyer Professor, Dept. of Physics, P.E.S.University, Bangalore - 560085	R Vasudevan
Expert from outside college, (V.T.U Nominee)	Dr.K.B.Vijayakumar Professor & Chairman, Dept. of Physics, Mangalore University, Mangala Gangothri, Mangalore - 5674199	K.B.Vijayakumar
Representative from industry/Corporate ector/allied area relating to placement nominated by Academic Council.(1)	Dr.P.Anil Kumar Associate Professor, Dept. of Physics, Indian Institute of Science, Bangalore 560012	ABSENT
Postgraduate Meritorious alumnus nominated by Principal.(1)	Alok Shankar, Senior Manufacturing Engineer, U.T.C. Space systems (Boing Cell) AERO Bangalore -560048	Alok Shankar

INTERNAL MEMBERS

Structure	Name of the Member	Signature
irman	Dr.T.Bhuvaneswar Babu Prof. & Head, Dept. of Physics, R.V.College of Engineering, Mysuru Road, Bangalore – 059.	Bhuvan
Faculty Members at different levels covering different specialization to be nominated by the Academic Council (5)	1Dr.D.N.Avadhani Associate Prof..	Avadh
	2.Dr.T.K.Subramanyam Associate Prof..	ABSENT
	3.Dr. Sudha Kamath M.K Associate Professor	Sudha Kamath
	4.Dr. G.Shireesha Assistant Professor	G. Shireesha
	5.Dr.. Shubha S Assistant Professor	Shubha

Bhuvan

DR. T. BHUVANESWARABABU

CHAIRMAN-BOS

COMBINED SCIENCE BOARD

R.V. COLLEGE OF ENGINEERING

(An Autonomous Institution under VTU, Belgaum)

DEPARTMENT OF PHYSICS

Minutes of the BoS meeting held on 20.02.2018 at 09:30am in the Seminar Hall, Dept. of Physics regarding to discuss Academic Progress.

Members Present: EXTERNAL

1. Dr.K.B.Vijaya Kumar, Professor & Chairman(BOS), Mangalore University, Mangalore.
2. Dr. R.Vasudevan Iyer, Professor, Dept. of Physics P.E.S University.

Members Present: INTERNAL

1. Dr. T.Bhuvaneswara Babu, Chairman, BOS, Professor, Dept. of Physics, R.V. College of Engineering, Bangalore.
2. Dr. D.N.Avadhani, Associate Professor, Dept. of Physics, R.V. College of Engineering, Bangalore.
3. Dr. T.K.Subramanyam, Associate Professor, Dept. of Physics, R.V. College of Engineering, Bangalore.
4. Dr..Sudha Kamath M.K, Associate Professor, Dept. of Physics, R.V. College of Engineering, Bangalore.
5. Dr. G.Shireesha, Assistant Professor, Dept. of Physics, R.V. College of Engineering, Bangalore.
6. Dr. S.Shubha, Assistant Professor, Dept. of Physics, R.V. College of Engineering, Bangalore.

Proceedings:

1. Dr. T. Bhuvaneshwara Babu, Chairman- BOS PHYSICS welcomed all the members and introduced all the members.
2. Dr. T. Bhuvaneshwara Babu, Chairman- appraised the members about the modification in the scheme of valuation of lab for CIE. Members suggested to increase the marks for substitution, calculation and accuracy (CO3) from 10 to 15.
3. Chairman briefed about the Supply of Course material through Quiklrn app.to the students and also about the conduction of online quiz. Members appreciated the same.
4. Plan to introduce open software based simulation lab experiments was discussed in the meeting, and Dr. Iyer suggested to introduce experiments which would not be done usually in a regular lab sessions or the simulations of experiments which are expensive to set up in labs.

R.V. COLLEGE OF ENGINEERING
Mysuru Road, Bangalore - 560059.
(An Autonomous Institution under VTU, Belgaum)

DEPARTMENT OF PHYSICS

Ref: RVE/PHY/……../2018-19 **Date:** 02.07.2018

MEETING NOTICE

Dear Sir/Madam,

Sub: Board of studies in Engineering Physics-Academic Progress-reg.

Meeting of the Board of Studies (BOS) in Engineering Physics is scheduled on 02.07.2018 at 09.30 A.M. in the Department of Physics to discuss Discussion on proposed syllabus for 2018 scheme.

Meeting Agenda:

No 33 1) Discussion on proposed syllabus for 2018 scheme.

Sl. No.	NAME OF THE BoS MEMBERS	SIGNATURE
01	Dr. R Chandramani, Prof. of Physics, Dayananda Sagar College of Engineering, Bangalore.	Absent
02	Dr. R.V Iyer, Professor, Dept. of Physics, P.E.S University, Bangalore	
03	Dr. K.B Vijaya Kumar, Professor, Mangalore University, Mangalore.	Absent
04	Mr. Alok Shankar, Senior Manufacturing Engineer, U.T.C Aero Space System (Boeing cell) Bangalore	
05	Dr. T Bhuvaneswara Babu, Chairman, BOS, Prof. & Head, Dept. of Physics, R.V College of Engineering, Bangalore.	
06	Dr. D.N Avadhani, Associate Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	Absent
07	Dr.T.K Subramanyam, Associate Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	Absent
08	Dr. Sudha Kamath M.K, Associate Professor, Dept. of Physics, R.V College of Engineering, Bangalore	Sudha Kamath
09	Dr. G.Shireesha, Assistant Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	G. Shireesha
10	Dr. S Shubha, Assistant Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	Shubha

Dr.T.Bhuvaneswara Babu 020718
Chairman BOS (Science)

17th BoS Meeting

R. V. COLLEGE OF ENGINEERING,

Mysuru Road, Bengaluru – 560 059

(An autonomous Institution Affiliated to VTU, Belgaum)

BOARD OF STUDIES IN ENGINEERING PHYSICS

Ref: RVE/PHY/...../2018-19 Date: 02.07.2018

Signature of the BoS Members present:

EXTERNAL MEMBERS

Structure	Name of the Member	Signature
Subject Experts from outside the college nominated by Academic Council.(2)	Dr. R.Chandramani Prof. of Physics, Dayanandasagar College of Engineering. Bangalore	
	Dr.R Vasudevan Iyer Professor, Dept. of Physics, P.E.S.University, Bangalore - 560085	
Expert from outside college, (V.T.U Nominee)	Dr.K.B.Vijayakumar Professor & Chairman, Dept. of Physics, Mangalore University, Mangala Gangothri, Mangalore - 5674199	
Representative from industry/Corporate ector/allied area relating to placement nominated by Academic Council.(1)	Dr.P.Anil Kumar Associate Professor, Dept. of Physics, Indian Institute of Science, Bangalore 560012	
Postgraduate Meritorious alumnus nominated by Principal.(1)	Alok Shankar, Senior Manufacturing Engineer, U.T.C. Aero Space systems (Boing Cell) Bangalore -560048	

INTERNAL MEMBERS

Structure	Name of the Member	Signature
Chairman	Dr.T.BhuvaneswaraBabu Prof. & Head, Dept. of Physics, R.V.College of Engineering, Mysuru Road, Bangalore – 059.	02/07/18
Faculty Members at different levels covering different specialization to be nominated by the Academic Council (5)	1Dr.D.N.Avadhani Associate Prof.	
	2.Dr.T.K.Subramanyam Associate Prof..	
	3.Dr. Sudha Kamath M.K Associate Professor	Sudha Kamath
	4.Dr. G.Shireesha Assistant Professor	G. Shireesha
	5.Dr.. Shubha S Assistant Professor	Shubha 2/7/18

DR. T. BHUVANESWARABABU 02/07/18
CHAIRMAN-BOS
COMBINED SCIENCE BOARD

R.V. COLLEGE OF ENGINEERING

(An Autonomous Institution under VTU, Belgaum)

DEPARTMENT OF PHYSICS

Minutes of the BoS meeting held on 02.07.2018 at 09:30am in the chambers of HoD Physics, to discuss the syllabus for the ensuing academic year 2018-19.

Members Present: EXTERNAL

1. Dr. R Vasudevan Iyer, Professor, Dept. of Physics P.E.S University.
2. Mr. Alok Shankar, Senior Manufacturing Engineer, U.T.C Aero Space System (Boeing cell) Bangalore.

Members Present: INTERNAL

1. Dr. T.Bhuvaneswara Babu, Chairman, BOS, Professor, Dept. of Physics, R.V. College of Engineering, Bangalore.
2. Dr. Sudha Kamath M.K, Associate Professor, Dept. of Physics, R.V. College of Engineering, Bangalore.
3. Dr. G.Shireesha, Assistant Professor, Dept. of Physics, R.V. College of Engineering, Bangalore.
4. Dr. S.Shubha, Assistant Professor, Dept. of Physics, R.V. College of Engineering, Bangalore.

Proceedings:

- Dr. T. Bhuvaneshwara Babu, Chairman- BOS PHYSICS welcomed all the members and introduced all the members.

- Dr. T. Bhuvaneshwara Babu, Chairman –BoS PHYSICS initiated the discussion on the proposed syllabus for Engineering physics. Following are the recommendations by the committee.
- Dr. Vasudevan Iyer suggested swapping Oscillations (Unit-I) with Elasticity (Unit II)

Unit I- Lasers and Optical fibres

I. No derivation necessary for attenuation coefficient in Optical fibres.
II. P2P the only application to be discussed in detail.
III. Semiconductor laser to be replaced by He-Ne laser.
IV. Remove LIDAR acronym from syllabus.

Unit- II- Quantum Mechanics

V. Increase teaching time to nine hours.

VI. Remove assumptions of Bohr's Atomic Model and begin with de-Broglie's hypothesis.

VII. Rename particle in a box to 1-D potential well, particle in a box as application.

VIII. Mention 3-D box as application to density of states.

Unit III – Electrical conductivity in metals and semiconductors:

I. Flow of contents to be altered to: CFET- QFET- Density of States (DOS)-Fermi Factor-Fermi Energy (E_f)- E_f relation to carrier concentration- temperature variation of Fermi Factor- Hall Effect.

II. Remove qualitative term from doping methods.

III. Hall Effect to be derived in metals and explained for electrons and holes for semi-conductors.

IV. Qualitative explanation of internal field and Claussius-Mossoti equation.

Unit IV-Elasticity:

V. It is suggested derive the general equation for bending moment of a beam and mentioning of expression for circular and rectangular cross section.

VI. Single cantilever to be taught as application during tutorial class.

VII. Time period for Torsion pendulum to be discussed in oscillation unit.

Unit V- Oscillations:

I. Draw parallel between spring-mass system with LCR

II. Discuss Torsional Pendulum in Oscillations Unit.

III. Discuss LC for electrical resonance.

- The above suggestions were incorporated and will be implemented in the proposed syllabus.
- The Syllabi of Engineering Physics (Theory) and Lab are approved for the implementation form the academic year 2018.
- Approval for the scheme of evaluation will be sought once it is finalized in the joint BoS.

Semester: I/II

Engineering Physics
(Theory & Practice)

Course Code: 18PH12/22		**CIE Marks:** 100+50
Credits: L:T:P:S: 3:1:1:0		**SEE Marks:** 100+50
Hours: 36		**SEE Duration:** 03+03 Hours

Course Learning Objectives: The students will be able to

1	Understand the principles of Lasers, Optical fibers and its application in modern technology.
2	Understand the principles of Quantum mechanics and its applications to diverse fields like lasers and electrical properties of materials.
3	Explain the Elasticity and Dielectric properties of materials.
4	Analyze the Electrical properties of the conductors and semiconductors.
5	Solve differential equations of harmonic oscillators to analyze experimental situations applicable to engineering field.

UNIT-I	
Lasers: Interaction of radiation with matter, Einstein's coefficients (expression for energy density). Requisites of a Laser system. Conditions for laser action. Principle, Construction and working of He-Ne Lasers. Application of Lasers in measurements of pollutants in atmosphere. Numerical problems. **Optical fibers:** Propagation mechanism, Angle of acceptance, Numerical aperture, Modes of propagation and Types of optical fibers. Attenuation: Causes of attenuation and expression for attenuation coefficient, applications of optical fibers. Discussion of block diagram of point to point communication. Numerical problems.	**07 Hrs**
UNIT-II	
Quantum mechanics: Matter waves, de-Broglie's Hypothesis and wavelength of matter waves. Heisenberg's Uncertainty principle and application (Broadening of spectral lines). Setting up of one dimensional time independent Schrodinger's wave equation. Significance of Wave function, normalization. Application of SWE to particle in a one- dimensional infinite potential well (Particle in a box). Extension to three dimensional well. Free particle and square well potential. Numerical problems.	**07 Hrs**
UNIT-III	
Electrical conductivity in metals and semiconductors: Review of Classical free electron theory, Quantum free electron theory, Density of states and Fermi factor. Fermi energy: variation with carrier concentration in metals, variation of Fermi factor with temperature. Drawbacks of QFET, Hall Effect, derivation of Hall coefficient in metals. Band theory of solids, (qualitative approach). Intrinsic semiconductors: carrier concentration, derivation of electron concentration in conduction band, expression for hole concentration in valence band, intrinsic carrier concentration (derivation), Fermi level in intrinsic semiconductors, Expression for the energy gap of intrinsic semiconductors. Numerical problems. Extrinsic semiconductors: Types of extrinsic semiconductors, doping methods (qualitative). Variation of carrier concentration in extrinsic semiconductors with temperature, variation of Fermi level in extrinsic semiconductors with temperature and impurity concentration. Hall effect for semiconductors. Numerical problems. **Dielectrics:** Electric dipole, Dipole moment, Polarization of dielectric materials: Types of polarizations. Qualitative treatment of Internal field in solids: for one dimensional infinite array of dipoles (Lorentz field) and Claussius - Mossotti equation. Numerical problems.	**08 Hrs**

UNIT-IV	
Elastic properties of materials: Elasticity: Concepts of stress, strain. Hooke's law, Elasticity, plasticity, strain hardening and strain softening, failure (fracture/fatigue). Different elastic moduli and derivation of their inter relationships, Poisson's ratio. Bending of beams: Neutral surface and neutral plane, expression for bending moment of a beam (Derivation), expression for circular and rectangular cross section. Application example: single cantilever (Derivation). Torsion of cylinder: Expression for couple per unit twist of a solid cylinder (Derivation). Numerical problems.	**07 Hrs**
UNIT-V	
Oscillations: Review of SHM, Free vibrations. Examples of Simple harmonic oscillators- a) Spring and Mass system, b) springs in series and parallel (L-C-R system), c) Torsional pendulum-Expression for period of oscillation. Damped and forced oscillations: Theory of damped oscillations: over damping, critical & under damping. Theory of forced oscillations and resonance, Sharpness of resonance, quality factor. Example for electrical resonance (LC, LCR circuit). Numerical problems.	**07 Hrs**
LAB EXPERIMENTS	
1. Experiments with Lasers and Optical Fibers. 2. Experiments on Light Emitting Diodes (LED). 3. Experiments on Energy band gap of a thermistor, Fermi energy of a conductor, Hall effect and Dielectric constant in a capacitor. 4. Experiments on spring constant in series and parallel combinations, single cantilever. 5. Experiments on Torsional pendulum and LCR circuit. 6. Innovative experiments using software.	

Course Outcomes: After completing the course, the students will be able to	
CO1:	Explain the fundamentals of lasers & optical fibers, quantum mechanics, electrical conductivity in metals and semiconductors, dielectrics, elastic properties of materials, oscillations and relate them to engineering applications.
CO2:	Apply and Demonstrate lasers & optical fibers, quantum mechanics, electrical properties, dielectric properties, elastic properties of materials, oscillations through experiential learning.
CO3:	Formulate and Evaluate lasers & optical fibers, quantum mechanics, electrical properties, dielectric properties, elastic properties of materials, oscillations towards specific engineering applications.
CO4:	Design and Develop innovative experiments.

Reference Books	
1.	Engineering Physics, R K Gaur and S L Gupta, 2011, Dhanpat Rai Publications, ISBN: 9788189928223
2.	A Textbook of Engineering Physics, P G Kshirsagar, M. N. Avadhanulu, 2010, S. Chand, ISBN : 13-9788121908177
3.	Engineering Physics, Hitendra K Malik and A K Singh, Tata McGraw Hill Publicaiton, 2010. ISBN: 9780070671539.
4.	Physics for Degree students, C.L. Arora and Dr. P. S. Hemne, revised 2010, S Chand, ISBN: 9788121933506
5	Fundamentals of Physics- Resnick, Halliday and Walker, 9th Ed, 2011, John Wiley & Sons, ISBN: 9780470547915

Continuous Internal Evaluation (CIE)				
(Theory – 100 Marks)		(Laboratory- 50 Marks)		Total
Evaluation method	Course with Assignment			
Quiz -1	10	Performance of the student in the laboratory, every week	30	
Test -1	50			
Quiz -2	10	Innovative experiments	10	
Test-2	50	Test at the end of the semester	10	
Quiz -3	10			
Test -3	50			
Assignment	20			
Final Evaluation	Quiz 10+10+10=30; Test 50+50+50=150, Reduced to 50, Assignment 20	**Total**	**50**	**150**

- **All the three tests and quiz are compulsory**

Semester End Evaluation (SEE)				
Theory (100 Marks)		Laboratory(50 Marks)		Total (150)
Part –A **Objective type questions**	**20**	**Experiment Conduction with proper results**	40	
Part –B There should be five questions from five units. Each question should be for maximum of 16 Marks. The **UNIT-1, UNIT-4 and UNIT-5** should not have any choice. The **UNIT-2 and UNIT-3** should have an internal choice. Both the questions should be of the same complexity in terms of COs and Bloom's taxonomy level.	**80**	**Viva**	10	

Total	100	Total	50	150

		What	To whom	Frequency of conduction	Max Marks	Evidence	Contribution to Course Outcome		
Direct Assessment Methods	C I E	Quiz	Students	Three	30	Answer Scripts	80%	100%	90%
		Test		Three	50				
		Self-study		2 phases	20	Reports / Record Books			
	S E E	Semester End Examination		End of every semester Consisting of Part-A and Part-B	100	Answer Scripts	20%		
Indirect Assessment methods		Course End Survey	Students	End of course		Questionnaire Based on COs	10%		

CO-PO Mapping (Theory)												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	3	1	2	-	-	-	-	2
CO2	3	3	1	2	3	1	2	-	-	-	-	1
CO3	3	3	2	3	1	2	-	-	-	1	-	1
CO4	3	2	3	1	3	-	1	-	3	3	-	2

Low-1 Medium-2 High-3

R. V. COLLEGE OF ENGINEERING,

Mysuru Road, Bengaluru – 560 059
(An autonomous Institution Affiliated to VTU, Belgaum)

BOARD OF STUDIES IN ENGINEERING PHYSICS

Chairman :	Dr.T.Bhuvaneswar Babu Prof. & Head, Dept. of Physics	Dept. of Physics R.V College of Engineering, Mysuru Road, Bangalore – 560059. Mob: 9448841776 Email: bhuvaneswarbt@rvce.edu.in
Faculty Members at different levels covering different specialization to be nominated by the Academic Council (5)	1Dr.D.N.Avadhani Associate Prof.	Dept. of Physics, R.V.College of Engineering, Mysuru Road, Bangalore – 560059. Mob: 9741419511 Email: avadhanidn@rvce.edu.in
	2.Dr.T.K.Subramanyam Associate Prof..	Dept. of Physics R.V.College of Engineering, Mysuru Road, Bangalore – 560059. Mob: 9945567140 Email: subramanyamtk@rvce.edu.in
	3.Dr. Sudha Kamath M.K Associate Professor	Dept. of Physics R.V.College of Engineering, Mysuru Road, Bangalore – 560059. Mob: 9480404395 Email: sudhakamath@rvce.edu.in
	4.Dr. G.Shireesha Assistant Professor	Dept. of Physics R.V.College of Engineering, Mysuru Road, Bangalore – 560059. Mob: 9036596525 Email: shireeshag@rvce.edu.in
	5.Dr. Shubha S Assistant Professor	Dept. of Physics R.V.College of Engineering, Mysuru Road, Bangalore – 560059. Mob: 9945486431 Email: shubhas@rvce.edu.in
Subject Experts from outside the college nominated by Academic Council.(2)	1 Dr. R.Chandramani Prof. of Physics	Dept. of Physics, Dayanandasagar College of Engineering. Kumara Swamy Lyout, Ph: 9901108108 E mail : rchandramani@rediffmail.com
	2. Dr.R.V.Iyer Prof. of Physics	Dept. of Physics, P.E.S.University, Outer Ring Road, Bangalore - 560085 Ph: 9845966554 E mail : rviyer@pes.edu
Expert from outside college, (V.T.U Nominee)	1. Dr.K.B.Vijayakumar Prof. & Chairman	Dept. of Physics, Mangalore University, Mangala Gangothri, Mangalore - 5674199 Ph: +91 9448953373 E mail : kbvijaymumar@yahoo.com
Representative from industry/Corporate	Dr.P.Anil Kumar Associate Prof.	Dept. of Physics, Indian Institute of Science,

Visvesvaraya Technological University

Jnana Sangama", Belagavi - 590 018.

Prof. Satish Annigeri Ph.D.
REGISTRAR (I/c)

Phone: (0831) 2405468
Fax : (0831) 2405467

Ref No. VTU/Aca/A12/2019-20/ 847/E

Date: 9 MAY 2019

To,

Dr.Anjana Jain,
Principal Scientist,
Material Science Division,
National Aerospace Laboratories,
Bengaluru-560 017

Sir/Madam,

Sub: Nomination to the Board of studies (Physics) of R. V. College of Engineering, Bengaluru (Autonomous) from 06/05/2019 to 05/05/2021.
Ref: Hon'ble Vice Chancellor's approval dated 06/05/2019

With reference to the above, I am pleased to nominate you as the Nominee of Visvesvaraya Technological University, Belagavi, to the "Board of Studies (Physics)" of R. V. College of Engineering, Bengaluru (Autonomous).

You are requested to accept the same and attend the meetings of the "Board of Studies (Physics)" of the college as and when requested by the principal of the college and ensure that the views and guidelines of the University are duly taken into account in the deliberations and decisions of the Board of Studies.

Thanking you,

Yours faithfully,

REGISTRAR (I/c)
9/5/19

Copy Fwc`s to:
The Principal, R. V. College of Engineering, Bengaluru., with a request to send meeting notices of the Board of studies Dr.Anjana Jain, from time to time. Please note that the TA/DA/Hospitality of V.T.U Nominee for attending Board of studies (Physics) meetings have to be borne by your college.

09/05/19

SSts /Store/ HOD- Physics

DEPARTMENT OF PHYSICS

R V COLLEGE OF ENGINEERING

Mysore road, Bangalore 560059.

(Autonomous Institution, Affiliated to V.T.U)

BOARD OF STUDIES IN ENGINEERING PHYSICS 2019

09-05-2019

Chairperson	Dr. Sudha Kamath M K Associate Professor & HoD Physics	Department of Physics, R V College of Engineering. Mysuru Road, Bengaluru-560059. Mobile: 9480404395 Email sudhakamath@rvce.edu.in
Faculty members at different levels, covering different specialization to be nominated by the academic council	1.Dr.T.Bhuvaneswara Babu Professor	Department of Physics, R V College of Engineering. Mysuru Road, Bengaluru-560059. Mob: 9448841776 Email: bhuvaneswarbt@rvce.edu.in
	2.Dr.D.N.Avadhani Associate Professor	Department of Physics, R V College of Engineering. Mysuru Road, Bengaluru-560059. Mob: 9741419511 Email: avadhanidn@rvce.edu.in
	3. Dr.T.K.Subramanyam Associate Professor	Department of Physics, R V College of Engineering. Mysuru Road, Bengaluru-560059. Mob: 9945567140 Email: subramanyamtk@rvce.edu.in
	4.Dr. G.Shireesha Assistant Professor	Department of Physics. R V College of Engineering. Mysuru Road, Bengaluru-560059. Mob: 9036596525 Email: shireeshag@rvce.edu.in
	5.Dr. Shubha S Assistant Professor	Department of Physics. R V College of Engineering. Mysuru Road, Bengaluru-560059. Mob: 9036596525 Email: shubhas@rvce.edu.in
Subject experts from outside the college to be nominated by the Academic council.	Dr. Sarbari Bhattacharya, Associate professor.	Department of Physics, Bangalore University, Bengaluru. Ph: 9480091036 Sarbari.bhattacharya@gmail.com
	Dr. Ramesh Thamakar, Associate Professor.	Department of Physics, School of Advanced Sciences, Vellore Institute of Technology University Vellore. Ph: 9742430830. Email: rameshm.thamankar@vit.ac.in

Subject Experts from outside the college, to be nominated by the Vice Chancellor from a panel of six recommended by the Principal.	Dr. Anjana Jain. Principal Scientist.	Material science division, National Aerospace laboratories, Bengaluru 560017. Ph:9448682877 Email: janjana@nal.res.in.
Representative from Industry/Corporate Sector/ Allied area relating to Placement, to be nominated by the Academic Council	Dr. Praveen K C Scientist E	Laboratory for Electro-Optics systems ISRO, Peenya Industrial Estate, Bengaluru 560058. Ph: 9740894773 Email: kcp@leos.gov.in
Postgraduate meritorious alumnus, to be nominated by the Principal (Preferably with Ph.D. and experience of more than 10 years)	Mr. Alok Shankar	Senior Manufacturing Engineer, UTC Space systems (BOING CELL) Bengaluru. Ph: 9480231611 Email:alok.rvce@gmail.com IRV05 ME 112 (2005-2009)

Sudha Kamath

Dr. Sudha Kamath M K 9/5/19

HoD-Physics

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

Principal 9/5/19

Sub. No. 198: Ratification of new Board of Studies members for the term 2019 – 2022 (May. 2019 – Apr. 2022)

Department of Physics

Chairperson	Dr. Sudha Kamath M K Associate Professor & HoD Physics	Department of Physics, R V College of Engineering. Mysuru Road, Bengaluru-560059. Mobile: 9480404395 Email sudhakamath@rvce.edu.in
Faculty members at different levels, covering different specialization to be nominated by the academic council	1.Dr.T.Bhuvaneswara Babu Professor	Department of Physics, R V College of Engineering. Mysuru Road, Bengaluru-560059. Mob: 9448841776 Email: bhuvaneswarbt@rvce.edu.in
	2.Dr.D.N.Avadhani Associate Professor	Department of Physics, R V College of Engineering. Mysuru Road, Bengaluru-560059. Mob: 9741419511 Email: avadhanidn@rvce.edu.in
	3. Dr.T.K.Subramanyam Associate Professor	Department of Physics, R V College of Engineering. Mysuru Road, Bengaluru-560059. Mob: 9945567140 Email: subramanyamtk@rvce.edu.in
	4.Dr. G.Shireesha Assistant Professor	Department of Physics. R V College of Engineering. Mysuru Road, Bengaluru-560059. Mob: 9036596525 Email: shireeshag@rvce.edu.in
	5.Dr. Shubha S Assistant Professor	Department of Physics. R V College of Engineering. Mysuru Road, Bengaluru-560059. Mob: 9036596525 Email: shubhas@rvce.edu.in
Subject experts from outside the college to be nominated by the Academic council.	Dr. Sarbari Bhattacharya, Associate professor.	Department of Physics, Bangalore University, Bengaluru. Ph: 9480091036 Sarbari.bhattacharya@gmail.com
	Dr. Ramesh Thamakar, Associate Professor.	Department of Physics, School of Advanced Sciences, Vellore Institute of Technology University Vellore. Ph: 9742430830. Email: rameshm.thamankar@vit.ac.in
Representative from Industry/Corporate Sector/ Allied area relating to Placement, to be nominated by the Academic Council	Dr. Praveen K C Scientist E	Laboratory for Electro-Optics systems ISRO, Peenya Industrial Estate, Bengaluru 560058. Ph: 9740894773 Email: kcp@leos.gov.in

To,
HoD-Physics
for records

R. Jeeeed

R V COLLEGE OF ENGINEERING
BANGALORE - 560 059

PTO

Sub. No. 198: Ratification of new Board of Studies members for the term 2019 – 2022 (May. 2019 – Apr. 2022)

Resolution: The Academic Council ratified the decision taken by the Institution with respect to nomination of new Board of Studies members, under the categories - "Two subject experts from outside the college & one representative from Industry/Corporate sector/allied area, relating to placement", for the term 2019-2022 (May. 2019 – Apr. 2022).

Signature of External Experts (Academic Council):

1. (S.V. RAVINDRA) 2. C V Vaidyanathan

3. (Prof. T.C. Thanuja) 4. (Dr. Y. J. RAO)

18th BoS Meeting.

R.V.COLLEGE OF ENGINEERING
Mysore Road, Bangalore – 560059.

DEPARTMENT OF PHYSICS

Ref. RVE/PHY/ /2019-20

Date: 24.04.2019

Submitted,

Sub: BoS in Engineering Physics-reg

Please grant us permission to conduct the Board of Studies meeting (BoS) on 06.052019(Monday) to discuss and approve the following agenda.

No 34 1. Discussion and approval of M.Tech (1st year 2nd Sem) Global elective -Physics of materials.

No 35 2. Discussion on global electives to be proposed to 5th & 6th semester UG Programme of 2018 syllabus.

Sudha Kamath 24.4.19
Dr. Sudha Kamath M.K
Dept. of Physics

permitted

24/4

R.V. COLLEGE OF ENGINEERING
Mysuru Road, Bangalore - 560059.
(An Autonomous Institution under VTU, Belgaum)

DEPARTMENT OF PHYSICS

Ref: RVE/PHY/……../2018-19 **Date:** 06.05.2019

MEETING NOTICE

Dear Sir/Madam,

Sub: Board of studies in Engineering Physics-Academic Progress-reg.

Meeting of the Board of Studies (BoS) in Engineering Physics is scheduled on 06.05.2019 at 10:30am in the Department of Physics.

Meeting Agenda:

27) Ratification of global elective syllabus "Physics of Materials" for II semester PG programme.
28) Discussion on global electives to be proposed to V & VI semester U.G Progrmme.

Sl. No.	NAME OF THE BOS MEMBERS	SIGNATURE
01	Dr. Anjana Jain. Principal Scientist, Material science division, National Aerospace laboratories, Bengaluru 560017.	
02	Dr. Praveen K C, Scientist E, Laboratory for Electro-Optics systems ISRO, Peenya Industrial Estate, Bengaluru 560058.	ABSENT
03	Mr. Alok Shankar, Senior Manufacturing Engineer, UTC Space systems (BOING CELL), Bengaluru.	ABSENT
04	Dr. Sudha Kamath M.K, Associate Professor& HoD., Dept. of Physics, R.V College of Engineering, Bangalore	Sudha Kamath 6.5.19
05	Dr. T Bhuvaneswara Babu, Chairman, BOS, Prof. & Head, Dept. of Physics, R.V College of Engineering, Bangalore.	
06	Dr. D.N Avadhani, Associate Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	6/5/19
07	Dr.T.K Subramanyam, Associate Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	6/5/19
08	Dr. G.Shireesha, Assistant Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	G. Shireesha 6/5/19
09	Dr. S Shubha, Assistant Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	Shubha

Sudha Kamath 6.5.19
Dr. Sudha Kamath M.K.
Chairman BOS (Physics)

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

R. V. COLLEGE OF ENGINEERING,

Mysuru Road, Bengaluru – 560 059

(An autonomous Institution Affiliated to VTU, Belgaum)

BOARD OF STUDIES IN ENGINEERING PHYSICS

Ref: RVE/PHY/...../2018-19 Date: 06.05.2019

Signature of the BoS Members present:

EXTERNAL MEMBERS

Structure	Name of the Member	Signature
Subject Experts from outside the college nominated by Academic Council.(2)	Dr. Anjana Jain. Principal Scientist. Material science division, National Aerospace laboratories, Bengaluru 560017.	Anjana
Expert from outside college, (V.T.U Nominee)	**(To be Nominated)**	
Representative from industry/Corporate Sector/Allied area relating to placement nominated by Academic Council.(1)	Dr. Praveen K C Scientist E Laboratory for Electro-Optics systems ISRO, Peenya Industrial Estate, Bengaluru 560058.	ABSENT
Postgraduate Meritorious alumnus nominated by Principal.(1)	Alok Shankar, Senior Manufacturing Engineer, U.T.C. Aero Space systems (Boing Cell) Bangalore -560048	ABSENT

INTERNAL MEMBERS

Structure	Name of the Member	Signature
Chairman	Dr. Sudha Kamath M.K Associate Professor, & Head, Dept. of Physics, R.V College of Engineering, Mysuru Road, Bangalore – 059.	Sudha Kamath 6.5.19
Faculty Members at different levels covering different specialization to be nominated by the Academic Council (5)	Dr.T.Bhuvaneswara Babu Professor	
	Dr.D.N.Avadhani Associate Prof.	6/5/19
	Dr.T.K.Subramanyam Associate Prof..	6/5/19
	Dr. G.Shireesha Assistant Professor	G. Shireesha 6/5/19
	Dr. Shubha S Assistant Professor	Shubha.

Sudha Kamath 6.5.19

Dr. Sudha Kamath M.K

CHAIRMAN-BOS (PHYSICS)

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

R.V. COLLEGE OF ENGINEERING

(An Autonomous Institution under VTU, Belgaum)

DEPARTMENT OF PHYSICS

Proceedings of the BoS meeting held on 06.05.2019.

Agenda:

Sub. No. 34: To read and record the proceedings of the 17th Board of Studies meeting held on 02.07.2018 and Action Taken Report.

Sub. No. 35: Ratification of global elective syllabus "Physics of Materials" for II semester M.Tech. programme.

Sub. No. 36: Discussion on global electives to be proposed to V & VI semester BE Programme

Members Present:

1. Dr. Sudha Kamath M.K, Chairperson, BoS, Associate Professor, Dept. of Physics, R.V. College of Engineering, Bengaluru.
2. Dr. T.Bhuvaneswara Babu, Professor, Dept. of Physics, R.V. College of Engineering, Bengaluru.
3. Dr. D.N.Avadhani, Associate Professor, Dept. of Physics, R.V. College of Engineering, Bengaluru
4. Dr. T.K.Subramanyam, Associate Professor, Dept. of Physics, R.V. College of Engineering, Bengaluru.
5. Dr. G.Shireesha, Assistant Professor, Dept. of Physics, R.V. College of Engineering, Bengaluru.
6. Dr. S.Shubha, Assistant Professor, Dept. of Physics, R.V. College of Engineering, Bengaluru.

External Experts: senior

1. Dr. Anjana Jain. Principal Scientist. Material science division, National Aerospace laboratories, Bengaluru 560017.

Leave of Absence:

1. Dr. Praveen K C, Scientist E, Laboratory for Electro-Optics systems ISRO.
2. Mr. Alok Shankar, Senior Manufacturing Engineer, U.T.C. Aero Space systems (Boing Cell), Bengaluru

The chairperson of BoS welcomed everyone. Chairperson thanked the previous members in their absentia and introduced the subject expert and the internal members. Also briefed about the college and its achievements to the members.

Sub. No. 34: To read and record the proceedings of the 17th Board of Studies meeting held on 02-07-2018 and Action Taken Report.

The Chairperson briefed the members about proceedings of the 17th Board of studies meeting held on 02-07-2018 and action taken thereon. As there were no comments from the members, the proceedings and the Action Taken were read and recorded.

Sub. No.	Agenda details	Action taken
34	Discussion & approval of proposed syllabus for 2018 scheme (Theory & Lab)	Suggestions incorporated & implemented

Sub. No. 35: Ratification of global elective syllabus "Physics of Materials" for II semester M.Tech. programme.

The syllabus for M.Tech global elective course "Physics of Materials" (Group G: Global Elective), Course Code: 18PHY2G09, was reviewed and ratified in the meeting with following recommendations.

Unit-I: In-depth treatment of the basics of crystal structures and addition of point and phase groups.

Unit-II: Addition of more applications in solid insulating materials, elaboration on techniques and classifica of piezo-electricity and novel polymer materials

Unit-III: The topics pertaining to Superconductivity and BCS theory must be explained in detail to students

Unit IV: Glass transition temperature to be included.

Unit-V: Emphasis on topics like Characterization techniques, preparation techniques and novel materials (CNTs, graphene).

Sub. No. 36: Discussion on global electives to be proposed to V & VI semester BE Programme

Chairperson explained the members about the plan, to offer global elective courses for V/VI semester B.E students (2018-Scheme). The syllabi were presented by the faculty who are proposing the electives from the department and appropriate corrections were suggested by the BoS members as follows.

Course: THIN FILM NANO DEVICE FABRICATION TECHNOLOGY

Proposed and presented by Dr. T K Subramanya.

Unit-III: Application of each type of Nano-sensor must be specified for teaching, example: "Development of Biosensor for the detection of Cancer".

Unit-II, IV and V: Suggested to simplify the contents with small modifications.

It was also suggested to give more Time & Marks to the "Laboratory Experiments-hands on exposure for device fabrication" during the course.

Course: PHYSICS OF REDUCED DIMENSIONS/NANO-STRUCTURES.

Proposed and presented by Dr. Tibrikram Gupta.

Teaching hours of **Unit I, II, III** are recommended to 8 hours each.

Unit V: Members Recommended to add some applications that are catering to the Physics layer of IOT industry and Quantum Information/Computation.

Course: PHYSICS OF SEMI-CONDUCTORS

Proposed and presented by Dr. Rajesh B M

Unit I: Members Suggested to include specific elaboration on properties of conduction and valance band. Inclusion of variation of Fermi level in uni-junction and bi-junction devices in qualitative level.

Unit 2: Derivation of density of states, Expression for carrier concentration in extrinsic semiconductors. Review of degenerate and non-degenerate energy levels.

Unit 3: Inclusion of tunnelling transport concept was recommended.

Unit 5: Inclusion of semiconductor quantum structures, photonic structures.

All these above suggestions made for the UG syllabi will be incorporated and the approval will be sought for the modified syllabi in the next BoS.

The meeting concluded with thanks to the Chair.

Sudha Kamath
Chairperson 6-5-2019

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

Semester: II		
PHYSICS OF MATERIALS **(Group G: Global Elective)**		
Course Code: 18PHY2G09		**CIE Marks: 100**
Credits: L:T:P:S: 3:1:0:0		**SEE Marks: 100**
Hours: 36		**SEE Duration: 3Hrs**

Course Learning Objectives:	
1	Classify the crystals based on lattice parameters.
2	Explain the behavior of Dielectrics with change in frequency.
3	Classify the magnetic materials based on Quantum theory as well understand superconductors.
4	Explain direct and indirect bandgap semiconductors, polymer semiconductors and Photoconductive polymers.
5	Describe the behavior of Smart materials and its phases and apply to Engineering applications.

Unit-I	
Crystal Structure Discussion of lattice and lattice parameters, seven crystals systems, crystal planes, Miller indices, Interplanar distance, Packing fraction, Structure of different crystals-Nacl and Diamond, Bragg's law, Powder method, Bragg's spectrometer, Qualitative Analysis of Crystal structure using XRD, Reciprocal lattice, Crystal defects-Point, Line, Planar and Volume defects.	**07 Hrs**
Unit – II	
Dielectric Materials Basic concepts, Langevin's Theory of Polarisation, Types of Polarisation, Dipolar relaxation, Frequency Dependence of total polarization (polarizability as a function of frequency), Qualitative discussion of Internal Field and Claussius Mossotti, Dielectric loss spectrum, Dielectric strength, Dielectric Breakdown, Breakdown mechanisms in solid dielectrics, Applications of Solid Insulating materials in capacitors and Liquid insulating materials in Transformers, Dielectric Heating, Piezoelectricity, Direct and Inverse Piezoelectric effect, Coupling factor, spontaneous polarization, Piezolelectricty in Quartz, Various piezoelectric materials- PZT, PVDF, Ferroelectricity, Barium titanate, Poling in ceramics.	**08 Hrs**
Unit -III	
Magnetic Materials Review of Dia, Para and Ferromagnetic materials, Weiss theory of Ferromagnetism, Hysteresis effect, Magnetostriction, Anti-ferromagnetism, Ferrimagnetsim, Soft and Hard magnetic materials, examples and applications in Transformer cores and Magnetic storage devices, Superconductors, properties, Types of Superconductors, BCS theory, High Temperature superconductors, Applications in Cryotron and SQUID.	**07 Hrs**
Unit –IV	
Semiconducting Materials Semiconductors-Direct and Indirect band gap semiconductors, Importance of Quantum confinement-quantum wires and dots, size dependent properties, Top down approach, Fabrication process by Milling and Lithography, Bottom up approach, fabrication process by vapour phase expansion and vapor phase condensation, Polymer semi-conductors-Photo conductive polymers, Applications.	**07Hrs**
Unit –V	
Novel Materials Smart materials-shape memory alloys, Austenite and Martensite phase, Effect of temperature and mechanical load on phase transformation, Pseudoeleasticity, Transformation hysteresis, Superelasticity, Characterization technique-Differntial Scanning calorimetry, Preparation technique-spin coating, Nitinol, CuAlNi alloy and applications. Biomaterials-Metallic, ceramic and polymer biomaterials, Titanium and Titanium alloys, Carbon nanotubes, Grapheme- properties and applications.	**07Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1:	Apply the principles of Physics in Engineering.
CO2:	Apply the knowledge of Physics for material analysis.
CO3:	Identify and analyze engineering problems to achieve practical solutions.
CO4:	Develop solutions for problems associated with technologies.

Reference Books	
1	Solid State Physics, S O Pillai, 6th Edition, New Age International Publishers, ISBN 10-8122436978.
2	Introduction to Solid State Physics, C.Kittel, 7th Edition, 2003, John Wiley & Sons, ISBN 9971-51-180.
3	Engineering Physics, Dr.M N Avadhanulu, Dr. P G Kshirsagar, S Chand Publishing, Reprint 2015.
4	The Science and Engineering of Materials, Askeland, Fulay, Wright, Balanai, 6th Edition, Cengage Learning, ISBN-13:978-0-495-66802-2.
5.	Applied Solid State Physics, M R Srinivasan, 1st Edition, New Age International Publishers, ISBN 978-81-224-3421-7
6.	Material Science, Rajendran V and Marikani, 1st Edition, Tata McGraw Hill, ISBN 10-0071328971.

Scheme of Continuous Internal Evaluation (CIE); Theory (100 Marks)
CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of two quizzes are conducted and each quiz is evaluated for 10 marks adding up to 20 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50 marks. A minimum of two assignments are given with a combination of two components among 1) solving innovative problems 2) seminar/new developments in the related course 3) Laboratory/field work 4) mini project.
Total CIE is 20+50+30=100 Marks.

Scheme of Semester End Examination (SEE) for 100 marks:
The question paper will have FIVE questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

Semester: V		
THE PHYSICS OF REDUCED DIMENSIONS/NANOSTRUCTURES (Group G: Global Elective)		
Course Code: 18PHY		**CIE Marks: 100**
Credits: L:T:P:S: 3:1:0:0		**SEE Marks: 100**
Hours: 40		**SEE Duration: 3Hrs**

Course Learning Objectives:	
1	See the role of Quantum mechanics in physical processes as we reduce dimensions.
2	Explain the design and performance of low dimensional devices.
3	Understand the profound difference in thermodynamic and transport properties of low dimensional materials.
4	Understand the role of heterostructures in devices
5	Design and development of smart devices and sensors that runs on the quantum aspects.

Unit-I	
Review of Quantum Mechanics and Solid state Physics Wave particle duality, Heisenberg's Uncertainty Principle, Time independent Schrodinger Equation and its application, Perturbation theory, Fermi's Golden Rule, Quantum mechanical coherence. Density of states and dimensionality. Lengths and time-scales. Free electron model of solids, Bloch theorem, Dynamics of electrons and holes in bands. Effective mass, Fermi-Dirac and Bose-Einstein statistics.	**8 Hrs**
Unit – II	
Physics of low dimensional semiconductors Intrinsic and extrinsic semiconductors, electron and hole concentration , Mobility, Energy Diffusion, Continuity equations. Carrier life-times and Diffusion length. Degenerate semiconductors. Optical processes of semi-conductors, inter-band and intra-band process. Quantum wells of different geometries-Square, Parabolic, Triangle. Quantum wires and Dots. Strained Layers and its effect on bands. Band structures in Quantum Wells. Excitonic effects in Quantum Wells.	**08 Hrs**
Unit –III	
Quantum Nano structures in Semiconductors MOSFET(discuss both p-channel and n-channel, but focus on n-channel), Homojunctions, Heterojunctions, Heterostructures, Modulation doped and strained, Quantum Wells, Super Lattices, Kronig Penney Model of a super-lattice, Zone folding , Tight Binding Approximation of a super lattice. The genesis of Quantum Transport:Parallel transport –scattering mechanism, experimental data(focus will be on GaAs), hot electrons. Perpendicular transport – Resonant tunneling. Electric field effect in super lattices	**08 Hrs**
Unit –IV	
Transport in Nano-structures in electric and magnetic field Quantized conductance-Landauer and Landauer Buttiker transmission formalism, Application of formalism to explain quantized conductance of devices like quantum point contacts. Weak localization and Aharonov-Bohm effect in gold rings and other systems. Violation of Kirchhoff's circuit laws for quantum conductors. Coulomb Blockade. DOS of a 2D system in a magnetic field. Landau quantization of electrons in a magnetic field. Shubnikov-de Haas effect. Quantum Hall Effect.	**8 Hrs**

Unit –V	
Applications of Quantum Dimensional systems and Nanostructures Lasers and photodetectors on quantum wells and quantum dots, High-mobility transistors, Ballistic-transport devices, Single-electron transistors Optical properties of Quantum Wells and Superlattices, Quantum Dots and Nano crystals. Quantum confined Stark effect, Stark ladders, Bloch oscillations. Spintronics. Johnson-Silsbee experiments , Datta Das Transistors.	**8 Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1:	After successful completion of the course the student will be able to identify the different domains of application of the concepts of Quantum mechanics in Nano structures, super-lattices, opto=electronics and quantum computation
CO2:	The student will gain knowledge to understand the crucial physics layer and principles that are at the core of nano and meso technology.
CO3:	The student will be able to apply the concepts to solve problems (quantitative and qualitative)
CO4:	The student can apply the concepts of one domain in another domain in an interdisciplinary manner and can create new ideas related to appliances and sensors, that use the said concepts.

Reference Books	
1	S. Datta, Electronic Transport in Mesoscopic Systems, Cambridge University Press (1997).
2	J.M. Martinez-Duert, R.J. Martin Palma and F. Agullo-Rueda, Nanotechnology for Microelectronics and Optoelectronics, Elsevier Press(2006)
3	S. M. Sze, Semiconductor Devices, Physics and Technology, 2nd Edition, Wiley Student Edition
4	Pallab Bhattacharya, Semiconductor Optoelectronic devices, Prentice Hall of India.
5.	David J Griffiths, Introduction to Quantum Mechanics, 2nd Edition, Prentice Hall/Pearson.

Scheme of Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of two quizzes are conducted and each quiz is evaluated for 10 marks adding up to 20 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50 marks. A minimum of two assignments are given with a combination of two components among 1) solving innovative problems 2) seminar/new developments in the related course 3) Laboratory/field work 4) mini project.
Total CIE is 20+50+30=100 Marks.

Scheme of Semester End Examination (SEE) for 100 marks:
The question paper will have FIVE questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

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DEPARTMENT OF PHYSICS

19th BoS Meeting.

Ref. RVE/PHY/ /2019-20

Date: 04.02.2020

Submitted,

Sub: BoS Meeting in Engineering Physics-reg.

Please grant us permission to conduct the Board of Studies meeting (BoS) on 22nd February 2020 (Saturday) to discuss and approve the Global electives syllebi of 5th sem & 6th sem of 2018 scheme.

Sudha Kamath 4-2-2020

Dr. Sudha Kamath M.K
HoD, Dept of Physics

Head of Department
R V College of Engineering
Bangalore - 560 059

permitted

4/2

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DEPARTMENT OF PHYSICS

Ref: RVE/PHY/……../2019-20 **Date:** 22.02.2020

MEETING NOTICE

Dear Sir/Madam,

Sub: Board of studies in Engineering Physics-Academic matters discussion-reg.

Meeting of the Board of Studies (BOS) in Engineering Physics is scheduled on 22.02.2020 at 10.00am. in the Department of Physics to discuss the following agenda.

Meeting Agenda:

Sub No.36. To read and record the proceedings of the 18th BoS meeting held on 06- 05-2019.
Sub No.37. To discus and approve global elective syllabi of 5th sem & 6th sem of 2018 scheme.
Sub No.38. Any other subject/s.

Sl. No.	NAME OF THE BoS MEMBERS	SIGNATURE
01	Dr. Anjana Jain, Principal, Scientist, Material Science division, National Aerospace laboratories, Bengaluru – 560017.	
02	Dr. Sarbari Bhattacharya, Associate Professor, Bengaluru University, Bengaluru	
03	Dr. Ramesh Thamankar, Associate Professor, Vellore Institute of Technology (VIT), Vellore	
04	Dr. Praveen K.C., Scientist E, Laboratory for Electro-Optics systems ISRO, Peenya Industrial Estate, Bengalruru – 560058.	
05	Mr. Alok Shankar, Senior Manufacturing Engineer, U.T.C Aero Space System (Boeing cell) Bangalore Chairperson	Absent
06	Dr. Sudha Kamath M.K, Associate Professor, Dept. of Physics, R.V College of Engineering, Bangalore	Sudha Kamath 22.02.2020
07	Dr. T Bhuvaneswara Babu, ~~Chairman~~, ~~BOS~~, Prof. ~~& Head,~~ Dept. of Physics, R.V College of Engineering, Bangalore.	
08	Dr. D.N Avadhani, Associate Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	
09	Dr. G.Shireesha, Assistant Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	G. Shireesha
10	Dr. S Shubha, Assistant Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	Absent

Sudha Kamath 22.2.2020
Dr.Sudha Kamath M.K
Chairman BOS

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

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DEPARTMENT OF PHYSICS

Ref: RVE/PHY/……../2019-20 **Date:** 22.02.2020

Signature of the BoS Members present:

EXTERNAL MEMBERS

Structure	Name of the Member	Signature
Expert from outside college, (V.T.U Nominee)	Dr. Anjana Jain, Principal, Senior Scientist, Material Science division, National Aerospace laboratories, Bengaluru – 560017.	
Subject Experts from outside the college nominated by Academic Council.(2)	Dr. Sarbari Bhattacharya, Associate Professor, Bengaluru University, Bengaluru	
	Dr. Ramesh Thamanker, Associate Professor, Vellore Institute of Technology (VIT), Vellore.	
Representative from industry/Corporate sector/allied area relating to placement nominated by Academic Council.(1)	Dr. Praveen, Scientist E, ISRO, Bengalruru.	
Postgraduate Meritorious alumnus nominated by Principal.(1)	Mr. Alok Shankar, Senior Manufacturing Engineer, U.T.C. Aero Space systems (Boing Cell) Bangalore -560048	Absent

INTERNAL MEMBERS

Structure	Name of the Member	Signature
Chairman	Dr. Sudha Kamath M.K , Chairperson HoD, Dept. of Physics, R.V College of Engineering, Mysuru Road, Bengaluru – 560059.	Sudha Kamath 22.2.2020
Faculty Members at different levels covering different specialization to be nominated by the Academic Council (5)	1. Dr. T.Bhuvaneswara Babu Professor,	
	2. Dr.D.N.Avadhani Associate Professor	
	3. ~~Dr. Sudha Kamath M.K Associate Professor~~	
	4. Dr. G.Shireesha Assistant Professor	
	5. Dr. Shubha S Assistant Professor	Absent

Sudha Kamath 22.2.2020

Dr. Sudha Kamath M.K

CHAIRMAN-BOS

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

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DEPARTMENT OF PHYSICS

Ref: RVE/PHY/...../2019-20 **Date:** 22.02.2020

Minutes of the BoS meeting held on 22.02.2020 at 10:00am in the chambers of HoD Physics, to discuss proposed syllabi for 2018 scheme global elective courses.

Members Present: EXTERNAL

1. Dr. Anjana Jain, Senior Principal, Scientist, Material Science division,NAL, Bengaluru.
2. Dr. Ramesh Thamankar, Associate Professor, Vellore Institute of Technology (VIT), Vellore.
3. Dr. Sarbari Bhattacharya, Associate Professor, Bengaluru University, Bengaluru.
4. Dr. Praveen, Scientist E, ISRO, Bengaluru.

Members Present: INTERNAL

1. Dr. Sudha Kamath M.K, HoD, Chairperson, BoS, Dept. of Physics, R.V.College of Engineering, Bengaluru.
2. Dr.T.BhuvaneswaraBabu, Professor, Dept.of Physics, R.V.College of Engineering, Bengaluru.
3. Dr. D.N Avadhani, Associate Professor, Dept.of Physics, R.V College of Engineering, Bengaluru.
4. Dr.G.Shireesha, Assistant Professor, Dept. of Physics, R.V.College of Engineering, Bengaluru.

Proceedings:

Dr Sudha Kamath, Chairperson of BoS welcomed everyone present. Chairperson thanked the previous members in their absentia and introduced the subject experts and the internal members. Also briefed about the college and its facilities, achievements to the members.

Sub. No.- 36 To read and record the proceedings of the 18th Board of Studies meeting held on 06/05/2019 and action taken report.

The chairperson briefed the members about proceedings of the 18th Board of studies meeting held on 06/05/2019 and action taken report thereon. As there were no comments from the members, the proceedings and the action taken were read and recorded.

Sub. No.- 37 - To discuss and approve global elective syllabi for 5th semester and 6th semester of 2018 scheme.

No.	Sem	Course Title	
1	V	Thin films and nanotechnology	Department of Physics is a part of college's CoE in Macro electronics. Under this CoE, interdisciplinary research centre is established with state of the art facilities for thin film development and characterisation. To promote and encourage students to take up studies in thin film domain and make use of in-house facilities the two electives are proposed. The board members suggested to make the course major in hands-on and to include fabrication/ development of thin film/ thin film device as a mini project under experiential learning.
2	VI	Thin film nano device fabrication technology	
3	V	Quantum mechanics of hetero/nano structures	This course is introduced with the intention of developing an appreciation for the qualitative changes that take place when we look at reduced dimensions like quantum dots, wires, wells and nanostructures. This has wide ranging applications in opto-electronics, **photonics** and nano-electronics. Board members appreciated the course content and the initiation. They suggested to include 3D nanostructures and the current state of MOSFET technology in details

The above suggestions were incorporated and implemented in the proposed syllabus.The Syllabi for 5th and 6th semester global electives were approved by the board members for the implementation from the academic year 2020.

Chairperson of BoS, Department of Physics thanked everyone for their presence and support.

Sudha Kamath 22.2.2020

Dr Sudha Kamath M.K.

Chairperson, BoS Dept. of Physics

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

Semester: V						
THIN FILMS AND NANOTECNOLOGY (Theory) (Global Elective)						
Course Code	:	18PHGXXX		**CIE**	:	100 Marks
Credits: L:T:P	:	3:0:0		**SEE**	:	100 Marks
Total Hours	:	36		**SEE Duration**	:	03 Hours

Course Learning Objectives: The students will be able to	
1	Understand the basics of thin films structure and property.
2	Acquire the knowledge of thin film preparation by various techniques and their characterization methods.
3	Apply the knowledge to select the potential methods to develop thin films for desired applications.
4	Explore thin film applications.

Unit-I	**07Hrs**
Nanostructures and Nanomaterials Types of nanostructures and properties of nanomaterials: Introduction, Three dimensional, Two dimensional, One dimensional, Zero dimensional nano-structured materials. Carbon Nano Tubes (CNT), Quantum Dots, shell structures, Multilayer thin films and super lattice clusters. Synthesis through Sol gel and Spray Pyrolysis. Mechanical-physical-chemical properties. Current trends and challenges of nanoscience and nanotechnology.	
Unit – II	**07Hrs**
Thin Film Preparation Methods **Vacuum technology-** Basics of Vacuum pumps and vacuum measurements, **Physical Vapour Deposition (PVD) Techniques:** Evaporation - Thermal evaporation, Electron beam evaporation, and Cathode arc deposition. **Sputtering:** DC sputtering, RF Sputtering, Magnetron sputtering, and Ion beam sputtering.	
Unit –III	**07Hrs**
Surface Preparation and Growth of Thin Films Nucleation – theoretical and experimental aspects. Surface preparation & Engineering for Thin film growth: Cleaning, Modification, Masking & Patterning, Base Coats and Top Coats. Thin Film growth: Sequence of thin film growth, Defects and impurities, Effect of Deposition Parameters on film growth. Properties of Thin Films: Adhesion, Thickness, Surface, Physical, Chemical and Mechanical.	
Unit –IV	**08Hrs**
Characterization of Thin Film Properties Film thickness measurement: Quartz crystal thickness monitor and Stylus Profiler methods. Surface morphology and topography by SEM , AFM Film composition by X-ray Photoelectron Spectroscopy ; Electrical characterization by Hall effect measurement, Four probeanalyzer Optical characterization – Ellipsometry, Raman Spectroscopy. Dielectric and Mechanical properties characterisation	
Unit –V	**07Hrs**
Thin Film Applications: Band gap Engineering through thin films for electrical and optical applications Thin Film for energy applications - coating on solar cells, fuel cells, batteries and super capacitors Thin film thermo electric materials for thermal sensor applications Thin film coating as protective coating for optical surfaces and as anti-reflection Thin Film drug delivery and antibacterial surfaces - opportunities and challenges	

Course Outcomes: After completing the course, the students will be able to	
CO1:	Understand the basics of thin film structures, mechanism of surface modification and thin film growth.
CO2:	Attain the knowledge of thin film preparation by various techniques and their characterization methods.
CO3:	Apply the knowledge to select the potential methods to develop thin films for desired applications.
CO4:	Develop and characterise thin films for various applications.

Reference Books	
1	Thin Film Phenomenon, K.L.Chopra, 1st edition, 1969, McGraw-Hill ISBN-13: 978-0070107991.
2	Materials Science of Thin Films, Milton Ohring, 2nd Edition, Academic Press, 2002, ISBN 978-0-12-524975-1
3	Thin-Film Deposition: Principles and Practice, Donald Smith, 1st edition, 1994, McGraw-Hill College, ISBN-13: 978-0071139137.
4	Handbook of Thin-Film Technology, Hartmut Frey, Hamid R Khan Editors, 1st edition, 2015, Springer, ISBN 978-3-642-05429-7.
5	Nanostructures and Thin Films for Multifunctional Applications Technology, Properties and Devices, Ion Tiginyanu, Pavel Topala, VeaceslavUrsaki, 1st edition, 2016, Springer, ISBN 978-3-319-30197-6.

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for experiential learning is 20.

Total CIE is 30(Q) +50(T) +20(EL) =100 Marks.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marksis executed by means of an examination. The Question paper for the course contains two parts, Part – Aand Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1									2
CO2	3	2	2	2								2
CO3	2	3	3	2		1	1	1				2
CO4	2	3	3	2	1	2	2	2	2	2		2

High-3: Medium-2: Low-1

Semester: V						
QUANTUM MECHANICS OF HETERO/NANO STRUCTURES (Theory) Global elective						
Course Code	:	18PHGXXX		**CIE**	:	100 Marks
Credits: L:T:P	:	3:0:0		**SEE**	:	100 Marks
Total Hours	:	36hrs		**SEE Duration**	:	03 Hours

Course Learning Objectives: The students will be able to	
1	Understand the role of Quantum mechanics in physical processes as we reduce dimensions.
2	Explain the design and performance of low dimensional semiconductors and their modelling.
3	Understand the differencesobserved in transport properties of low dimensional materials.
4	Apply the role of heterostructures in devices
5	Acquire the knowledge to design and develop smart devices and sensors that runs on the quantum technology.

Unit-I	**08Hrs**
Review of Quantum Mechanics and Solid state Physics Wave particle duality, Heisenberg's Uncertainty Principle, group velocity, Time independent and dependent Schrodinger Equation and its application, Perturbation theory, Fermi's Golden Rule. Free electron and Fermi gas model of solids, Density of states and dimensionality, Bloch theorem in periodic structures, Dynamics of electrons and holes in bands, Effective mass, distinct regimes of conduction	
Unit – II	**07Hrs**
Basics of semiconductors and lower dimensions. Intrinsic and extrinsic semiconductors, electron and hole concentration. Mobility, Energy Diffusion, Continuity equations. Carrier life-times and Diffusion length. Degenerate semiconductors. Optical processes of semi-conductors, inter-band and intra-band process.Quantum wells of nanostructures of different geometries-Square, Parabolic, Triangular and their solutions, Quantum Dots, wires and wells(From 0D to 3D). Strained Layers and its effect on bands. Band structure/energy levels in Quantum Wells and Excitonic effects in them.	
Unit –III	**07Hrs**
Quantum Nano structures and Quantum Transport Architecture and working of n-channel MOSFET, metal – semiconductor contact (interface), Homo-junction, Hetero-junction, Hetero-structures. Modulation and strain doped Quantum Wells. Super Lattice: Kronig Penney Model of a super-lattice, Tight Binding Approximation of a super lattice. The genesis of QuantumTransport: Parallel transport: scattering mechanism, experimental data (focus will be on GaAs), hot electrons. Perpendicular transport: Resonant tunnelling. Electric field effect in super lattices: Stark effect.	
Unit –IV	**07Hrs**
Transport in Nano-structures in electric and magnetic fields Quantized conductance: Landauer Buttiker transmission formalism, Application of formalism to explain quantized conductance of devices like quantum point contacts. Aharonov-Bohm effect in gold rings and other systems. Violation of Kirchhoff's circuit laws for quantum conductors. Coulomb Blockade. Density of States of a 2D system in a magnetic field. Landau quantization of electrons in a magnetic field. Shubnikov-de Haas effect. Quantum Hall Effect-integer and quantum.	
Unit –V	**07Hrs**
Applications in Opto-electronics and Spintronics: Lasers and photodetectorson quantum wells and quantum dots, High-mobility transistors, Ballistic-transport devices, Single-electron transistors,Optical properties of Quantum Wells and Superlattices, Quantum Dots and Nano crystals. Quantum confined Stark effect, Stark ladders and Bloch oscillations. Spintronics, transport of spin, spin valve, Giant Maneto-resistance,Spin Injection (Johnson-Silsbee experiments).	

Course Outcomes: After completing the course, the students will be able to	
CO1:	After successful completion of the course the student will be able to identify the different domains of application of the concepts of Quantum mechanics in Nano structures, super-lattices and Photonics.
CO2:	The student will gain knowledge to understand the crucial physics layers and principles that are at the core of nano and meso technology.
CO3:	The student will be able to apply the concepts to solve problems (quantitative and qualitative)
CO4:	The student can apply the concepts in an interdisciplinary manner and can create new ideas and products related to appliances and sensors that use the said concepts.

Reference Books	
1	The Physics of Low Dimensional Semiconductors an introduction, John H Davies, 1st Edition, 1998, Cambridge University Press, ISBN: 0-521-48491-X
2	Introduction to Quantum Mechanics, David J Griffiths and Darrell F. Schroeter, 3rd Edition, 2018, Cambridge University Press, ISBN: 978-1107189638
3	Nanotechnology for Microelectronics and Optoelectronics, J.M. Martinez-Duert, R.J. Martin Palma and F. Agullo-Rueda, 1st Edition, 2006, Elsevier Press, ISBN: 9780080456959
4	ElectronicTransportinMesoscopicSystems, Supriyo Datta, 1st Edition,1997,Cambridge University Press ISBN: 9780521599436
5	Semiconductor Optoelectronic devices, Pallab Bhattacharya, 2nd Edition, 1996, Prentice Hall of India, ISBN: 978-0134956565
6	Semiconductor Devices, Physics and Technology, S. M. Sze, 2nd Edition, 2008, Wiley Student Edition, ISBN: 978-8126516810

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for experiential learning is 20.

Total CIE is 30(Q) +50(T) +20(EL) =100 Marks.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marksis executed by means of an examination. The Question paper for the course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	1	3	2	2	1	2	1	2
CO2	3	3	3	2	1	2	1	1	1	2	1	2
CO3	3	3	3	2	1	1	1	1	1	2	1	2
CO4	3	3	3	2	1	2	2	1	3	3	1	2

High-3: Medium-2: Low-1

Semester: VI						
THIN FILM NANO DEVICE FABRICATION TECHNOLOGY -TFNDFT **(Group - F: Global Elective)**						
Course Code	:	18PHGXXX		**CIE**	:	**100 Marks**
Credits: L:T:P	:	**3:0:0**		**SEE**	:	**100 Marks**
Total Hours	:	**36**		**SEE Duration**	:	**03 Hours**

Course Learning Objectives:Students will be able to have	
1	Basic understanding of vacuum and related technology
2	Knowledge of growth, optimization and characterization of thin films and nanostructures
3	Design appropriate growth technique for desired application
4	Fabricate and Evaluatethin film nanodevices for advanced applications

Unit-I	**07Hrs**
Vacuum Technology: Introduction (KTG, classification of Vacuum), Gas transport and pumping, Q-rate calculation, Basics of Vacuum - Principles of different vacuum pumps: Rotary, Roots, Diffusion, Turbo molecular, and Cryogenic pumps, getter pumps (NEG), sublimation pump (TSP); differential pumping, Measurement of vacuum - Concept of Capacitance Manometer, Pirani and Penning gauges.	
Unit – II	**07Hrs**
Substrate Surfaces & Thin Film Nucleation: Atomic view of substrate surfaces, Thermodynamic aspects of nucleation, Kinetic processes in nucleation and growth, experimental studies of nucleation and growth (Brief) **Defects In Thin Films:** 0-D (point defects), 1-D (line defects), 2&3-D (grain boundaries, stacking faults, crystal twins, voids and precipitates), strain mismatch, Ion implantation defects (Amorphization), Effects of defects on the film (Electrical resistivity, PN junction leakage current, diffusion, Mechanical stress), defect propagation in films	
Unit –III	**07Hrs**
Fabrication Techniques **Chemical Approaches:** Electro Spinning and spin coating routes, Pulsed electro-chemical vapor deposition (PECVD) **Physical Approaches:** Metalorganic chemical vapor deposition (MOCVD), Atomic Layer Deposition (ALD) - pulsed laser deposition, Arc plasma deposition. **Lithography:** Photo/FIB techniques, Etching process: Dry and Wet etching	
Unit –IV	**07Hrs**
Characterization Techniques **Surface morphology measurements**: Kelvin-probe Force Microscopy (KFM), Surface X-ray Diffraction (SXRD), **Vacancy type defects and interfacial surface chemistry**: Positron Annihilation Lifetime Spectroscopy (PALS), Angle Resolved X-ray Photoelectron spectroscopy (ARXPS) **Point, line defects, grain boundary studies**: Transmission Electron microscopy (TEM), UV Visible Spectroscopy (UV-Vis)	
Unit –V	**08Hrs**
Silicon wafer fabrication – Wafer to cell formation - I-V characteristics and spectral response of c-Si solar cells. Factors limiting the efficiency, Differences in properties between crystalline silicon and amorphous (a-Si) silicon **Thin Film Solar Cells**: Principle of multi-junction cells, Structure and fabrication of GaInP/GaAs/Ge triple junction solar cell - Cell configuration – techniques used for the deposition of each layer- cell characteristics, optical efficiency measurements (brief) **Thin film Nano Biosensor**: Biosensors and nanotechnology, Basic biosensor architecture, Biosensor (receptor/antigen) recognition element, Biosensor transducer (electrochemical, optical, thermal, mass), Glucowatch™, Examples in cancer detection **Field Effect Transistors**: Overview, Basic Structure, I-V Characteristics, Lateral transport of electrons in different regions of transistors.	

Course Outcomes: After completing the course, the students will be able to	
CO1:	Choose the right choice of material for the desired application
CO2:	Improve the desired nanostructures and their properties
CO3:	Fabricate appropriate Nanodevices
CO4:	Optimize the nanodevice fabrication process for repeatability.

Text Books	
1	Condensed matter Physics, Michael P. Marder, 2nd Edition, John Wiley & Sons, 2009, ISBN 978-0-470-61798-4
2	Materials Characterization, Introduction to Microscopic & Spectroscopic Methods, Y. Leng, 2nd Edition, Wiley & Sons,2008, ISBN 978-0-470-82298-2
3	Vacuum Technology, Practice for Scientific Instruments, Nagamitsu Yoshimura, Springer, 2008, ISBN: 978-3-540-74432-0
4	Chemical Sensors and Biosensors; Brian, R Eggins, 1st Edition, John Wiley & Sons, 2002, ISBN: 978-0471899143

Reference Books	
1	Solid State Physics, Ashcroft &Mermin, 2nd Edition, Brooks/Cole, 1976, ISBN-13: 978-0030839931
2	Nanotechnology for photovoltaics,LoucasTsakalakos, 1st Edition, 2010, ISBN 9781420076745.
3	Microfabrication for Industrial Applications, Regina Luttge, 1st Edition, William Andrew,2011, ISBN: 9780815515821.

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for experiential learning is 20.

Total CIE is 30(Q) +50(T) +20(EL) =100 Marks.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marksis executed by means of an examination. The Question paper for the course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	-	-	-	-	-	-		-	2
CO2	3	2	2	2	-	-	-	-	-		-	2
CO3	2	3	3	2	2	1	1	1	-	1	-	2
CO4	2	3	3	2	2	2	2	2	2	2	-	2

High-3: Medium-2: Low-1

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DEPARTMENT OF PHYSICS

Ref: RVE/PHY/...../2020-21 **Date:** 11.06.2021

Minutes of the BoS meeting held on 12.06.2021 at 3:45 pm through Google Meet online platform to discuss proposed syllabus for 2018 scheme VII semester global elective course "Introduction to Astrophysics".

Members Present: EXTERNAL

1. Dr. Anjana Jain, Senior Principal, Scientist, Material Science division, National Aerospace laboratories, Bengaluru – 560017.
2. Dr. Ramesh Thamankar, Associate Professor, Vellore Institute of Technology (VIT), Vellore, TN.
3. Dr.Sharbari Bhattacharya, Associate Professor, Bengaluru University, Bengaluru
4. Dr. Praveen, Scientist E, ISRO, Bengaluru. **(In-Absentia)**
5. Mr. Alok Shankar: Senior Manufacturing Engineer, UTC Space systems (BOEING CELL), Bengaluru

Members Present: INTERNAL

1. Dr.T.BhuvaneswaraBabu, Professor, Dept.of Physics, R.V.College of Engineering, Bangalore.
2. Dr. D.N Avadhani, Associate Professor, Dept.of Physics, R.V College of Engineering, Bangalore.
3. Dr.G.Shireesha, Assistant Professor, Dept. of Physics, R.V.College of Engineering, Bangalore.
4. Dr. Shubha S, Assistant Professor, Dept.of Physics, R.V. College of Engineering, Bangalore.

Sudha Kamath
16.6.21

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

20th BoS Meeting

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DEPARTMENT OF PHYSICS

Proceedings:

Dr. Bhuvaneswara Babu, (i/c) Chairperson of the BoS committee welcomed everyone present.

Sub. No.- 39 To read and record the proceedings of 19th Board of studies meeting held on 22/02/2020 and action taken report.

The chairperson briefed the members about proceedings of 19th Board of studies meeting held on 22/02/2020 and action taken report thereon. As there were no comments from the members, the proceedings and the action taken were read and recorded.

Sub No	Agenda Details	Action taken
39	The VI Semester undergraduate course, THIN FILM NANO DEVICE FABRICATION TECHNOLOGY -TFNDFT (Group - G: Global Elective), Course Code:	Suggestions incorporated and implemented
	The V Semester undergraduate course, PHYSICS OF REDUCED DIMENSIONS/NANO-STRUCTURES, (Group - G: Global Elective), Course Code:	Suggestions incorporated and implemented
	The V Semester undergraduate course, PHYSICS OF SEMI-CONDUCTORS, (Group - G: Global Elective), Course Code:	Suggestions incorporated and implemented

Sub. No.- 40 - To discuss and approve global elective syllabus for 7th semester of 2018 scheme.

I. The VII Semester undergraduate course, INTRODUCTION TO ASTROPHYSICS, (Group - H: Global Elective), taught by Dr. Karthik Shastry, to be introduced in the next academic scheme, the major recommendations by the honourable committee members are as follows:

Unit 1

To begin with proper introduction to the origin of various theories in chronology (Geo-centric, Helio-centric), include the origin of the universe (Big bang theory, Cosmic background), more content about exoplanets and similar units to other units

Unit 2

To include Doppler effect of light (Red Shift & Blue Shift), Schwarzschild spacetime (qualitatively), Past-Present-Future (Light Cone diagram) (qualitatively). Move Schrodinger's wave equation to Unit-3

Unit 3

To begin the unit with dispersion of light (Prism & Grating), blackbody radiation, Connection between Colour and Temperature, Stellar Parallax, Magnitude Scale from unit-1, include the life cycle of stars, add Schrodinger's TISE & TDSE equations from Unit-2.

Unit 4

To include Spectral Lines, de-Broglie's Wavelength and Frequency, Heisenberg's Uncertainty Principle from Unit-2.

Unit 5

To include exoplanets and determination techniques of detection of exoplanets from Unit-1

Collective decision was taken to offer this course in 7th semester. For all the courses the following general suggestions were made:

- ✓ In reference section bifurcate reference books and textbooks
- ✓ Keep the recent publications as reference books say from last 5 to 8 years of publications

The above suggestions were incorporated and will be implemented in the proposed syllabus. The Syllabus for 7th semester global elective is approved for the implementation from the academic year 2021.

Meeting concluded with thanks to the chair.

Sudha Kamath 16.6.2021

Chairperson, BoS department of Physics.

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

Semester: VII						
INTRODUCTION TO ASTROPHYSICS (Group H: Global Elective)						
Course Code	:	18XX7H13		**CIE**	:	**100 Marks**
Credits: L :T:P	:	3:0:0		**SEE**	:	**100 Marks**
Total Hours	:	39L		**SEE Duration**	:	**3.00 Hours**

Course Learning Objectives: The students will be able to

1	Familiarize with the various celestial bodies and the laws governing their behavior
2	Understand the fundamental concepts of relativity and establish the relation between light and matter
3	Study the methods used to identify and investigate the nature of different stellar bodies
4	Determine the characteristic features of any star by understanding its spectral properties
5	Contemplate the complex system of the milky way galaxy and its components

Unit-I	**7 Hrs**
Fundamental concepts in Astronomy: Origin of the Universe, Major constituents of the universe, Cosmic Microwave Radiation (CMR) background, Geocentric Universe, Retrograde Motion of planets, Brief introduction to the Copernican Revolution, Positions of the Celestial Sphere: Altitude-Azimuth Coordinate System, Equatorial Coordinate System, Solar System, Planets - laws of motion of planets, inner planets, outer planets,	
Unit – II	**8 Hrs**
Theory of Special Relativity: Galilean Transformations, Failure of Galilean Transformations, Lorentz Transformations, Derivation, Time & Space in Special Relativity, Momentum & Energy in Relativity, Doppler Effect for light (Red & Blue Shift), The equivalence principle, the principle of minimal gravitational coupling, Schwarzschild spacetime, Past-Present-Future (Light Cone diagram).	
Unit –III	**8 Hrs**
Stellar Astrophysics: Blackbody radiation, Connection between Color and Temperature, Stellar Parallax, Magnitude Scale, Life cycle of stars (Birth, Life & Death), Hertzsprung-Russel Diagram, Classification of Binary Stars, Mass Determination using Visual Binaries, Eclipsing Spectroscopic Binaries, Formation of Spectral Lines, Schrodinger's time-dependent and independent equations, Boltzmann-Saha Equation, Chandrashekar's Limit, black holes (qualitatively).	
Unit –IV	**8 Hrs**
Light and Matter: Dispersion of light (Prism & Grating), Spectral Lines, de-Broglie's Wavelength and Frequency, Heisenberg's Uncertainty Principle, Broadening of Spectral liness **Spectral Characterization of Stars:** Description of the Radiation Field, Stellar Opacity, Transfer Equation, Profile of Spectral Lines, Optical Telescopes, Radio Telescopes (Case Studies)	
Unit –V	**8 Hrs**
Galaxy Astronomy: The Milky way Galaxy, Counting the Stars, Historical Models, Differential & Integrated Star Counts, Extrasolar planets, Methods of detection of extrasolar planets, Distance to the Galactic Centre, Galactic Coordinate System, Classification of Galaxies, Introduction to Elliptical galaxies, Irregular galaxies, Dwarf galaxies.	

Course Outcomes: After completing the course, the students will be able to	
CO1:	Contemplate the nature of our universe by identifying and studying the behavior of celestial bodies
CO2:	Explain the usefulness of the theory of relativity, light and matter in establishing the fundamental behavior of stellar bodies
CO3:	Utilize various techniques to discover the components of our universe and conclude their celestial properties
CO4:	Interpret the spectral properties of any astronomical body to illustrate its properties
CO5:	Inspect the milky way galaxy to identify the proponents and their characteristic features

Text book	
1	Suresh Chandra Mohit Kumar, A Textbook of Astronomy and Astrophysics, Dreamtech Press, 1 Nov 2019, ISBN-10: 9389520908
Reference Books	
2	Bradley W. Carroll, Dale A. Ostlie, An Introduction to Modern Astrophysics: United States Edition, Pearson; 1st

	edition (7 September 2017), ISBN-10: 1108422160
3	Padmanabhan, T., Theoretical Astrophysics, Vols.1-3, 2015, Cambridge University Press, ISBN- 9780521016278
4	Modern Cosmology, Academic Press Inc; 2nd edition, 7 July 2020, ISBN-10: 0128159480,
5	Harwit, M. Astrophysical Concepts, 4th Edition, 2015, Springer-Verlag, ISBN-10 : 1441921990
6	Shapiro, Stuart L., and Saul A. Teukolsky. Black Holes, White Dwarfs, and Neutron Stars, 1st Edition, 1983, Wiley, ISBN: 9780471873167

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Assignment/Presentation/Project (A). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Assignment/Presentation/Project 20.

Total CIE is 30(Q) +50(T) +20(A) =100 Marks.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marks is executed by means of an examination. The Question paper for the course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	-	-	1	-	1	-	-	2
CO2	3	2	2	2	-	-	1	-	1	-	-	2
CO3	2	3	1	2	2	1	1	-	2	1	-	2
CO4	3	3	1	2	2	1	2	-	3	3	-	2

High-3: Medium-2: Low-1

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21st BoS Meeting.

DEPARTMENT OF PHYSICS

Ref. RVE/PHY/ /2020-21

Date: 17.08.2021

Submitted:

Subject: BoS meeting in Engineering Physics-regarding:-

It is planned to conduct online Board of Studies meeting on 21st August 2021, at 3.00pm to discuss and approve the revised syllabus of Engineering Physics for the academic year 2021-22. I request your good self to kindly permit us to conduct the same. Also request you to sanction an amount of Rs. 10,000/- towards the meeting sitting charges to external members. (5 x Rs. 2000/-)

Sudha Kamath

HoD Physics. 17.8.2021

A/c permitted

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

21st meeting

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DEPARTMENT OF PHYSICS

Ref: RVE/PHY/57.3../2020-21 **Date:** 21.08.2021

Minutes of the BoS meeting held on 21.08.2021 at 2:30 pm through Google Meet online platform to discuss proposed syllabus for 2018 scheme I & II semester physics course "Physics of materials & Electro-Magnetism" and " Physics of materials & Thermodynamics" respectively.

Members Present: EXTERNAL

1. Dr. Anjana Jain, Senior Principal, Scientist, Material Science division, National Aerospace laboratories, Bengaluru – 560017.
2. Dr. Ramesh Thamankar, Associate Professor, Vellore Institute of Technology (VIT), Vellore, TN.
3. Dr.Sarbari Bhattacharya, Associate Professor, Bengaluru University, Bengaluru
4. Dr. Praveen, Scientist E, ISRO, Bengaluru.
5. Mr. Alok Shankar: Senior Manufacturing Engineer, UTC Space systems (BOEING CELL), Bengaluru

Members Present: INTERNAL

1. Dr. Sudha Kamath M K, Head, Dept. of Physics, R V college of Engineering, Bengaluru.
2. Dr.T.BhuvaneswaraBabu, Professor, Dept.of Physics, R.V.College of Engineering, Bengaluru.
3. Dr. D.N Avadhani, Associate Professor, Dept.of Physics, R.V College of Engineering, Bengaluru.
4. Dr.G.Shireesha, Assistant Professor, Dept. of Physics, R.V.College of Engineering, Bengaluru.
5. Dr. Shubha S, Assistant Professor, Dept.of Physics, R.V. College of Engineering, Bengaluru.
6. Dr. Tibikram Gupta, Assistant Professor, Dept.of Physics, R.V. College of Engineering, Bengaluru.
7. Dr. B M Rajesh, Assistant Professor, Dept.of Physics, R.V. College of Engineering, Bengaluru.
8. Dr. Ramya P. Assistant Professor, Dept.of Physics, R.V. College of Engineering, Bengaluru.
9. Dr. Karthik Shastry, Assistant Professor, Dept.of Physics, R.V. College of Engineering, Bengaluru.

Proceedings:

Dr. Sudha Kamath, Chairperson of the BoS committee welcomed everyone present. Chairperson explained to external members about the purpose of revision of syllabus and also mentioned that syllabus is formulated giving importance to guidelines of the National Education Policy 2020. Chairperson also explained in detail the structure of the course and scheme given by the principal. Members appreciated the plan of introducing two separate syllabi for circuit and non-circuit programmes.

Sub. No.- 41 To read and record the proceedings of 20th Board of studies meeting held on 13/06/2021 and action taken report.

The chairperson briefed the members about proceedings of 20th Board of studies meeting held on 13/06/2021 and action taken report thereon. As there were no comments from the members, the proceedings and the action taken were read and recorded.

Sub No	Agenda Details	Action taken
39	The VII Semester undergraduate course, INTRODUCTION TO ASTROPHYSICS (Group - H: Global Elective), Course Code: 18G7H13	Suggestions incorporated and implemented

Sub. No.- 42 - To discuss and approve the revised syllabus of Engineering Physics for the Academic year 2021-22.

I. The I & II semester undergraduate course, "PHYSICS OF MATERIALS & ELECTRO-MAGNETISM" and " PHYSICS OF MATERIALS & THERMODYNAMICS" respectively, taught by faculty of Physics department, to be introduced in the next academic scheme in lieu with NEP-2020. The major recommendations by the honourable committee members are as follows:

Unit 1: Elasticity & Oscillations (Common Unit)

To begin with proper introduction to basics of elasticity and oscillations, Concerns regarding repetition of syllabus was raised by Dr. Anjana Jain and her queries were answered by chairperson by stating that the treatment of the topics are done purely from a Physics perspective and further applications were related to the engineering aspect of the course.

Unit 2: Quantum Mechanics & Lasers (Common Unit)

Concerns regarding the continuity between two parts of the unit were aired by Dr. Thamankar. Appropriate clarification was provided by stating that Laser was chosen as an application of quantization.

Unit 3: Electrical Properties of Metals & Semi-conductors (Common Unit)

The committee members suggested to include energy level diagrams and remove certain other topics. The role of pre-requisites in this unit was also raised by Dr. Sarbari Bhattacharya. Proper explanations were provided by chairperson as to what extent of knowledge students are expected to learn. Energy diagrams were requested to be taught in this course, but were later dropped based on time constraints. LED topic was moved to Experiential Learning part of the unit based on Dr. Bhattacharya's suggestion. Dr. Praveen suggested incorporating CZ & FZ method, but was later rejected as it was synthesis topic.

Unit 4: Dielectric Properties of Materials & Optical Fibers (Circuit Branch)

The relation between two sections of the unit was aired by Dr. R Thamankar. The reasoning provided was the application of propagation of an EM wave in a dielectric medium. Applications of P2P to be provided and specific case studies to be explored under EL. Further, optical fibre attenuation to be discussed with respect to application.

Unit 4: Basic Thermodynamics (Non-Circuit Branch)

Temperature measurement is to be included as an application for Zeroth Law of Thermodynamics.

Unit 5: Electro-Magnetic Theory (Circuit Branch)

The unit was deemed too heavy for 9 hours and appropriate topics from magneto-statics are to be combined with electro-statics. Clarifications with regards to how the topics in this unit are taught were provided. Topics like Gauss divergence theorem, Stoke's theorem, Biot-Savart's law, Lenz's law to be omitted to reduce the unit load.

Unit-5: Basics of Fluid Mechanics (Non-Circuit Branch)

In order to reduce the load of Unit-V, only Venturimeter is to be explained as an application for Bernoulli's theorem. Further modifications can be applied.

Laboratory Experiments:

Appropriate care taken when mentioning open-source ware tools as COMSOL is a paid software.

The above suggestions were incorporated and will be implemented in the proposed syllabus. The two syllabi which are framed for circuit and non-circuit programmes were approved by all members, and would be implemented to 2021 batch First year UG students.

The meeting ended with thanks to the Chair and committee members.

Sudha Kamath
21-8-21

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

22nd Mtg

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DEPARTMENT OF PHYSICS

Ref: RVE/PHY/……..2022-23 **MEETING NOTICE** **Date: 28.05.2022**

Dear Sir/Madam,

Sub: Board of studies in Engineering Physics- Academic matters discussion-reg.

Meeting of the Board of Studies (BoS) in Engineering Physics is scheduled on 28.05.2022 @ 10:00am in the Department of Physics to discuss the following agenda.

Meeting Agenda:-

Sub No.45: To read and record the proceedings of the 21st BoS meeting held on 21st August 2021.
Sub No.46: To discuss and approve the Engineering Physics syllabus for the academic year 2021-22
Sub No.47: Any other subject/s.

Sl. No.	NAME OF THE BoS MEMBERS	Signature
01	Dr. PRASHANTH C UPADHYA, Head, Laser Systems Instruments Division, Laboratory for Electro-Optics Systems, ISRO, Bangalore – 560058.	28/5/2022
02	Dr. RAMESH MOHAN THAMANKAR, Associate Professor, Dept. of Physics, School of Advanced Sciences, Vellore Institute of Technology University, Vellore. Ph: 9742430830 E mail id : rameshm.thamankar@vit.ac.in	28/05/22
03	Dr. ANIL KUMAR A, Principal, Scientist, Advanced Composite Division (ACD) CSIR, National Aerospace Laboratries, Kodihalli, Bangalore – 560017. Ph: 9880646735 mail id : anil@nal.res.in	28/5/2022
	Mr. ABHIJITH PRAHLAD, Sai Shakthi Enclave, FF-9B, HV Halli Road, Near SBI, BEML 5th Stage, Rajarajeshwari Nagar, Bangalore – 560098. Ph: 8748827358 mail id : pabhibhar@gmail.com	28/5/2022
05	Dr. Sudha Kamath M.K Associate Professor & HoD, Dept. of Physics, R.V College of Engineering, Bangalore.	Sudha Kamath 28.5.22
06	Dr. Bhuvaneswara Babu T, Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	28/5/22
07	Dr. Avadhani D.N, Associate Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	28.5.2022
08	Dr. Shireesha G Associate Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	G. Shireesha 28/5/2022
09	Dr. Shubha S Assistant Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	ABSENT
10	Dr. Karthik Shastry, Asst. Professor, Dept. of Physics, R.V College of Engineering, Bangalore.	28/5/22

Sudha Kamath 28.5.22

Dr. Sudha Kamath M.K

CHAIRPERSON-BOS

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

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DEPARTMENT OF PHYSICS

Ref: RVE/PHY/...../2021-22 **Date:** 28.05.2022

Minutes of the BoS meeting held on 28.05.2022 at 10:30 am in the Physics seminar hall to introduce to the new BoS members and discuss proposed syllabus for 2021 scheme I & II semester physics course "Engineering Physics".

Members Present: EXTERNAL

1. Dr. Prashanth C Upadhya, Scientist, Laboratory for Electro-Optics Systems (LEOS), Indian Space Research Organisation (ISRO), Bengaluru.
2. Dr. Ramesh Thamankar, Associate Professor, Vellore Institute of Technology (VIT), Vellore, TN.
3. Dr. Basavaraj Angadi, Associate Professor, Bengaluru University, Bengaluru **(in-Absentia)**
4. Dr. Anil Kumar A, Principal Scientist, CSIR-NAL, Bengaluru.
5. Mr. Abhijith Prahlad, Entrepreneur & Engineer, , Bengaluru

Members Present: INTERNAL

1. Dr. Sudha Kamath M K, Associate Professor & Head, Dept. of Physics, RV college of Engineering, Bengaluru.
2. Dr. Bhuvaneswara Babu T, Professor, Dept. of Physics, RV College of Engineering, Bangalore.
3. Dr. Avadhani DN, Associate Professor, Dept. of Physics, RV College of Engineering, Bangalore.
4. Dr. Shireesha G, Assistant Professor, Dept. of Physics, RV College of Engineering, Bangalore.
5. Dr. Shubha S, Assistant Professor, Dept. of Physics, RV College of Engineering, Bangalore.
6. Dr. Karthik Shastry, Assistant Professor, Dept. of Physics, RV College of Engineering, Bangalore.

Proceedings:

Dr. Sudha Kamath, Chairperson of the BoS committee welcomed everyone present. She thanked the previous members in their absentia and introduced the new members of the BoS from academia, research and industry and internal members. Also briefed about the college and its facilities, achievements to the members.

Sub. No.- 45 To read and record the proceedings of 21st Board of studies meeting held on 21/08/2021 and action taken report.

The chairperson briefed the members about proceedings of 21st Board of studies meeting held on 21/08/2021 and action taken report thereon. As there were no comments from the members, the proceedings and the action taken were read and recorded.

Sub No	Agenda Details	Action taken
42	The I &II Semester undergraduate course, ENGINEERING PHYSICS, Course Code: 21PH12/22	Suggestions incorporated and implemented

Sub. No.- 46 - To discuss and approve I &II semester syllabus of 2021 scheme.

I. The I & II semester undergraduate course, "ENGINEERING PHYSICS, Course Code: 21PH12/22", taught by faculty of Physics department, to be introduced in the next academic scheme in lieu with NEP-2020. The major recommendations by the honourable committee members are as follows:

Mr. Abhijith and Dr. Prashanth Upadhya suggested that branch specific applications be made for each unit taught for the respective departments.

Unit 1: Elasticity & Oscillations

To begin with proper introduction to basics of elasticity and oscillations, The organisation of the unit was explained by Dr. Sudha Kamath and the how suitable time was spent on proper consolidation of fundamental concepts. Dr. Prashant upadhya stressed on providing adequate applications in this unit. Other external members had no issues with the unit.

Unit 2: Quantum Mechanics

Dr. Thamankar and Dr. Anil emphasized on the treatment of basic concepts like de-Broglie's hypothesis and Heisenberg's uncertainty principle. They also urged the faculty to teach the reasons for

the origin of Quantum Mechanics using suitable case studies. Assurances were provided that the unit would be dealt with outmost care and proper inundation of basics would be taught to the students. No further concerns were aired by the members.

Unit 3: Electrical Properties of Metals, Semi-conductors & Dielectrics

The committee members suggested including the example of variation in Fermi level in a P-N junction device. "Semiconductor devices- S.M Sze" was suggested as reference book for Units II and III.

Unit 4: Lasers & Optical Fibres

Dr. Upadhya and Dr. Thamankar suggested introducing continuous wave and pulsed beam lasers as part of the unit. Furthermore, Time of Flight measurement experiment and introduction to polymer fibre optics was also suggested to be made part of the unit.

Unit 5: Electro-Magnetic Theory (Circuit Branch)

The committee members suggested introducing Maxwell's equations as part of the topic as and when appropriate. No further changes were mentioned

Laboratory Experiments:

No specific suggestions were made. The committee members were happy with the idea and execution of the laboratory experiments.

. For all the courses the following general suggestions were made:

- ✓ Keep the recent publications as reference books say from last 5 to 8 years of publications
- ✓ To teach with appropriate examples specific to the branch.
- ✓ For the SPARK batch, the members suggested proper care in teaching the course to a heterogenous group of students
- ✓ Based on the current need of the hour, a bridge/elective course for diploma/ higher semester BE students in Quantum cryptography/communication was mooted. Appropriate actions will be taken by concerned faculty members and future discussions will be held for logistics of the course.

The above suggestions will be implemented in the proposed syllabus. The Syllabus for 1st year Circuit and Non-circuit Physics course is approved for the implementation from the academic year 2022-23.

The meeting ended with thanks to the Chair and committee members.

Subject No: 47 Any other subject/s

Action taken points for the course end survey taken from the students of previous academic year were brought to the notice of the BoS members.

Signature of the members present

Sl. No.	External Member	Signature
01	Dr. Prashnth C Upadhya	Prash 28/5/2022
02	Dr. Ramesh Mohan Thamankar	28/05/22
03	Dr. Anil Kumar A	28/5/2022
04	Mr. Abhijith Prahlad	28/5/22

Sl. No.	Internal Member	Signature
01	Dr. Sudha Kamath M.K Associate Professor & HoD	Sudha Kamath 28.5.22
02	Dr. Bhuvaneswara Babu T Professor	28/5/22
03	Dr. Avadhani D.N Associate Professor	28.5.2022
04	Dr. Shireesha G Associate Professor	G. Shireesha 28/5/22
05	Dr. Shubha S Assistant Professor	ABSENT
06	Dr. Karthik Shastry Assistant Professor	28/5/22

Semester: I/II						
Engineering Physics (Theory & Practice)						
Course Code	:	21PH12		**CIE**	:	**150 Marks**
Credits: L: T:P	:	3:0:1		**SEE**	:	**150 Marks**
Total Hours	:	42L		**SEE Duration**	:	**3.00 Hours**

Unit-I	**9 Hrs**
Elasticity and Oscillations: **Elasticity:** Hooke's law (qualitative), bending of beams, single cantilever (derivation), torsion of a cylinder: torsion pendulum, Numerical problems. **Oscillations:** Damped and forced harmonic oscillations: differential equation for damped and forced oscillations, LCR circuit (qualitative), electrical resonance, Numerical problems.	
Unit – II	**8 Hrs**
Quantum mechanics Blackbody radiation, Matter waves, Group velocity and phase velocity, Heisenberg's Uncertainty principle and its application, Broadening of spectral lines, One dimensional time independent Schrodinger's wave equation (TISE), Properties of wave function, Eigen functions and Eigen values, application of TISE: One dimensional infinite potential well and free particle. Numerical problems.	
Unit –III	**9 Hrs**
Electrical Conductivity in solids: Postulates of Classical free electron theory (CFET) and Quantum free electron theory (QFET), Density of states in three dimensions (qualitative) and Fermi factor. Fermi energy: variation of Fermi factor with temperature. Band theory of solids (qualitative approach), electron concentration in metals at 0K. Intrinsic semiconductors: electronic concentration in conduction band and hole concentration (qualitative), Fermi level in intrinsic semiconductors, Extrinsic semiconductors: Variation of carrier concentration with temperature and Fermi energy with doping, Hall effect for metals and semiconductors, Numerical problems. **Dielectrics:** Types of Polarizations. Qualitative treatment of Internal field in solids for one dimensional infinite array of dipoles (Lorentz field). Clausius-Mossotti equation(derivation). Numerical problems.	
Unit –IV	**8 Hrs**
Lasers and Optical fibers: **Lasers:** Interaction of radiation with matter, Energy density in terms of Einstein's coefficients, Laser requisites, CO_2 laser, Application of laser, Laser in eye and skin surgery, Numerical problems. **Optical Fibres:** Numerical aperture of an optical fibre, types of optical fibres, V-number, attenuation in optical fibres, types of attenuation, Point to Point communication, applications in sensors and phase modulators, Numerical problems.	
Unit –V	**8 Hrs**
Electron Ballistics & Surface Characterization Techniques Motion of charged particle in transverse $\vec{E}$ & $\vec{B}$ fields: $\vec{E}$ perpendicular to velocity, electrostatic deflection (qualitative), electron projected at an angle (qualitative), Magnetic field acting at an angle to initial velocity, Lorentz force equation, Application of crossed $\vec{E}$ & $\vec{B}$ configuration as a velocity selector, Electron & Magnetic lens, Applications in Scanning Electron Microscope, Scanning Tunnelling Electron Microscope. Numerical problems.	

Sl. No.	Lab Experiments
1	Determination of Young's modulus of the given material.
2	Determination of rigidity modulus of the given material.
3	Determination of spring constant, effective spring constants using springs in series and parallel.
4	Determination of wavelength of the given laser.
5	Determination of hall coefficient and carrier concentration of a given semiconductor.
6	Determination of the band gap of a given thermistor.
7	Determination of dielectric constant of a material using charging and discharging of the given capacitor.
8	Determination of numerical aperture, acceptance angle and fiber loss of a given optical fibers.
9	Fermi energy of a material.
10	Verification of Stefan's Law.

Course Outcomes: After completing the course, the students will be able to	
CO1:	Understand the basic principles of oscillator, elastic properties of materials, quantum mechanics, electrical properties of metals & semiconductors, dielectric properties of materials and behavior of charged particles in electric and magnetic field.
CO2:	Apply the Physics principles to solve Engineering problems in elasticity, oscillation, applied optics, and semiconductors.
CO3:	Analyze and solve complex problems using critical thinking.
CO4:	Design and development of models by simulation using open-source tools and validate with real time experimentation.

Reference Books	
1	Engineering Physics, Hitendra K Malik and A K Singh, 2010, Tata McGraw Hill Publication, ISBN: 9780070671539.
2	Engineering Physics, R K Gaur and S L Gupta, 2011, DhanpatRai Publications, ISBN: 9788189928223.
3	A Textbook of Engineering Physics, M. N. Avadhanulu and P G Kshirsagar, 2019, S. Chand publications, ISBN : 978-93-528-3399-3.
4	Physics for Degree students, C.L. Arora and Dr. P. S. Hemne, revised 2010, S Chand, ISBN: 9788121933506.
5	Fundamentals of Physics- Resnick, Halliday and Walker, 9th Edition, 2011, John Wiley & Sons, ISBN: 9780470547915.
6	Introduction to Electrodynamics, David J. Griffiths, 4th Edition, 2012, Pearson publishers, ISBN.978-93-325-5044-5.

ASSESSMENT AND EVALUATION PATTERN		
WEIGHTAGE	**50%**	**50%**
QUIZZES		
Quiz-I	Each quiz is evaluated for 10 marks adding up to **20 MARKS.**	*****
Quiz-II		
THEORY COURSE (Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating)		
Test – I	Each test will be conducted for 50 Marks adding upto 100 marks. Final test marks will be reduced to **40 MARKS**	*****
Test – II		
EXPERIENTIAL LEARNING	**40**	*****
Case Study-based Teaching-Learning	**10**	*****
Sector wise study & consolidation (viz., Engg. Semiconductor Design, Healthcare & Pharmaceutical, FMCG, Automobile, Aerospace and IT/ITeS)	**20**	
Video based seminar (4-5 minutes per student)	**10**	
MAXIMUM MARKS FOR THE THRORY	**100 MARKS**	**100 MARKS**
PRACTICALS	**50**	**50**
TOTAL MARKS FOR THE COURSE	**150**	**150**

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	---	--		2	--	--	--	--	--	3
CO2	3	2	---		--	--	--	--	--	--	--	--
CO3	3	3	2	2	2	--	--	--	2	--	--	--
CO4	3	3	3	2	3	2	2	--	2	3	3	--

High-3: Medium-2 : Low-1

Prashanth Upadhya 28/5/2022
(Prashanth Upadhya)

28/05/22
(RAMESH THAMANKAR)

28/5/22
(ABHIJEET PRAHLAD)

(Anilkumar A)

RV Educational Institutions ®
RV College of Engineering ®

Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi

Approved by AICTE, New Delhi

DEPARTMENT OF PHYSICS

23rd BoS Meeting.

Ref: RVCE/PHY/808/A/2022-23

Date: 22.11.2022

Submitted:

Subject: Request to seek BoS suggestions/consent about syllabi from BoS members through mail regarding: -

With respect to the above-mentioned subject, I would like to bring to your kind information that the VTU nominee for Board of studies in Physics Dr. Prashanth Upadya is unable to attend offline/online BoS meeting due to his family member's hospitalization. Also, one of the main subject experts is out of station, and expressed his unavailability for the meeting. Hence, it is decided to send the syllabi to all the members through mail and seek their suggestions/consent about the syllabi of all four different streams. I request your good self to kindly permit us to do so and once the issues settle down, we would call for the offline meeting and get the ratification done by the BoS members.

Kindly do the needful and oblige.

Permitted as a special case.

Sudha Kamath
HoD Physics
22-11-22

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

22/11/22

RVCE email

DEPARTMENT OF PHYSICS RVCE <hod.physics@rvce.edu.in>

Syllabus revision_Engineering Physics.

DEPARTMENT OF PHYSICS RVCE <hod.physics@rvce.edu.in> Wed, Nov 23, 2022 at 1:03 PM
To: Prashanth C Upadhya <pupadhya@leos.gov.in>, rameshm.thamankar@vit.ac.in, "Basavaraj Angadi (ಬಸವರಾಜ್ ಅಂಗಡಿ)" <brangadi@gmail.com>, A Anil Kumar <aanil@nal.res.in>, pabhibhar@gmail.com
Bcc: "Bhuvaneswar Babu T." <bhuvaneswarbt@rvce.edu.in>, "Avadhani D.N." <avadhanidn@rvce.edu.in>, "Shireesha G." <shireeshag@rvce.edu.in>, "Shubha S." <shubhas@rvce.edu.in>, "Dr. Karthik Shastry" <karthikshastry@rvce.edu.in>

Dear all,

Greetings from R V College of Engineering!!!

I take this opportunity to update you all about the recent developments with respect to academics of the department.
Dr. VidyaShankar, Former VC KSOU, has taken over as Vice chancellor of VTU. Under the new leadership, we received the directions to revise the syllabus of the first year engineering curriculum. It is also directed to frame the syllabus, cluster wise. Hence by taking the suggestions from heads of all the programs we prepared cluster wise syllabus. We also have a constraint to maintain 60% commonality with the VTU syllabus.

Engineering Streams are as follows.
CSE stream: CSE, IS, AI&ML, CD, CY, BT
Computer Science, Information Science, Data Science, Cyber security and Artificial Intelligence and Machine learning.
Electrical & Electronics Stream: EC, EE, ET, EI
Mechanical Engineering Stream: ME, IM, AS, CH
Civil stream (stand-alone)

As the classes for first year begin from 12th December, 2022, and due to some technical issues, I am unable to schedule the Board of Studies meeting in Engineering Physics. Therefore, I am hereby mailing the syllabi of all the four streams to the esteemed members of the group. It's my humble request with you all to kindly go through all the four syllabi and provide your valuable suggestions if any, and also give your consent to go ahead with the syllabus. Once the things settle down, I would call an offline meeting and get the ratification done in the meeting.

Looking forward to your suggestions and consent to go ahead with the syllabus, at the earliest.

Thanks and regards
Dr Sudha Kamath M K
HoD, Department of Physics
RVCE, Bengaluru -56.
9480404395

Sudha Kamath
Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

4 attachments

Applied Physics for Engineers-CV.doc
91K

Classical Physics for Engineers. -(ME,IM,AS,CH).doc
100K

RVCE email

DEPARTMENT OF PHYSICS RVCE <hod.physics@rvce.edu.in>

Syllabus revision_Engineering Physics.

Ramesh Thamankar <researchgroupramesh22@gmail.com> Sun, Dec 4, 2022 at 2:18 PM
To: "hod.physics@rvce.edu.in" <hod.physics@rvce.edu.in>

Dear Sudha,
please check the attached files.
there are some textual errors in the files.

other than that, everything is fine from my side.

you can go ahead with these syllabi.

best wishes
Ramesh Thamankar

On Wed, Nov 23, 2022 at 1:17 PM Ramesh M Thamankar <RameshM.Thamankar@vit.ac.in> wrote:

"Oxygen cylinders are available in the form of Tree's and FOREST". These cylinders are available for FREE"

From: DEPARTMENT OF PHYSICS RVCE <hod.physics@rvce.edu.in>
Sent: Wednesday, November 23, 2022 1:03 PM
To: Prashanth C Upadhya; Ramesh M Thamankar; Basavaraj Angadi (ಬಸವರಾಜ್ ಅಂಗಡಿ); A Anil Kumar; pabhibhar@gmail.com
Subject: Syllabus revision_Engineering Physics.

[Quoted text hidden]

4 attachments

Classical Physics for Engineers. -(ME,IM,AS,CH).doc
100K

Applied Physics for Engineers-CV.doc
92K

Condensed matter Physics for engineeers.-EC,EE,ET,EI).doc
102K

Quantum Physics for Engineers-(CS,IS,AI &ML,CY, CD).doc
156K

Sudha Kamath

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

5/12/2022

RVCE email

DEPARTMENT OF PHYSICS RVCE <hod.physics@rvce.edu.in>

Syllabus revision_Engineering Physics.

Basavaraj Angadi (ಬಸವರಾಜ್ ಅಂಗಡಿ) <brangadi@gmail.com> Tue, Nov 29, 2022 at 4:56 PM
To: DEPARTMENT OF PHYSICS RVCE <hod.physics@rvce.edu.in>
Cc: Prashanth C Upadhya <pupadhya@leos.gov.in>, rameshm.thamankar@vit.ac.in, A Anil Kumar <aanil@nal.res.in>, pabhibhar@gmail.com

Dear Madam,

Thanks for the mail and for sending the syllabus copies. I have reviewed the papers, and they appear to be in order. You may go ahead with the proposed syllabus.

Regards
Angadi

Dr. Basavaraj Angadi
Associate Professor
Department of Physics
Bangalore University
Bangalore - 560 056
India
e-mail : brangadi@bub.ernet.in
Phone : +91-9972025110
Web: http://bangaloreuniversity.ac.in/resume/phy-dr-basavaraj-angadi/
Web : http://sites.google.com/a/bub.ernet.in/angadi/
Researcher ID :http://www.researcherid.com/rid/B-2459-2010
Publons : https://publons.com/a/999042

[Quoted text hidden]

Sudha Kamath
29.11.22

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

RVCE email

DEPARTMENT OF PHYSICS RVCE <hod.physics@rvce.edu.in>

Syllabus revision_Engineering Physics.

Anil Kumar A <aanil@nal.res.in> Fri, Nov 25, 2022 at 9:23 PM
To: hod physics <hod.physics@rvce.edu.in>

Dear Madam,
Thank you for the email and the information.
I went through the engineering physics syllabi. It looks to be optimized for the engineering stream. However, I felt a few topics are missing: Darcy's law and its applications, Reynold's number and Bernoulli's principle and its applications. It's good, if this is already covered under some other topics. If these topics are too high for the first year stream, you may ignore this. Suggestions in topics may be incorporated in Civil Stream and/or ME syllabus.
Please go head with your syllabus.
With Regards,
Dr. Anil Kumar A
CSIR-NAL

From: "hod physics" <hod.physics@rvce.edu.in>
To: pupadhya@leos.gov.in, "rameshm thamankar" <rameshm.thamankar@vit.ac.in>, brangadi@gmail.com, "Anil Kumar A" <aanil@nal.res.in>, pabhibhar@gmail.com
Sent: Wednesday, November 23, 2022 1:03:01 PM
Subject: Syllabus revision_Engineering Physics.
[Quoted text hidden]

Sudha Kamath
25.11.22

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

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Approved by AICTE, New Delhi

Go, change the world

Ref: RVCE/PHY/816-A / 2022 MEETING NOTICE Date: 02-12-2022

Dear Sir, Madam,

Sub: Board of studies in Physics –Academic matters discussion – reg.

Meeting of the 23rd Board of Studies (BoS) in Physics is scheduled on 5th December 2022 at 10:30am in the department of Physics to discuss the following agenda.

Meeting Agenda: -

Sub No.: 47A: To read and record the proceedings of 22nd Board of studies meeting held on 28-05-2022 and action taken report.

Sub No.: 47 B: To discuss and approve I &II semester stream wise syllabi of 2022 scheme.

Sub No.: 47C: Any other matter/s

Sl. No.	NAME OF THE BOS MEMBERS (External)	SIGNATURE
01	Dr. Prashanth C Upadhyaya Head, Laser Systems Instruments Division, Laboratory for Electro-Optics Systems, ISRO, Bangalore – 5600058 Mob :9686367984	All members sent their feedback and suggestions through mail.
02	Dr. Ramesh Thamankar, Associate Professor. Department of Physics, School of Advanced Sciences, Vellore Institute of Technology University Vellore. Ph:9742430830. Email: rameshm.thamankar@vit.ac.in	
03	Dr.Basavaraj Angadi Associate professor.Department of Physics, Bangalore University, Bengaluru-560056 Ph: 9972025110 brangadi@gmail.com	
04	Dr. Anil Kumar A, Principal Scientist, Advanced Composite Division,(ACD) CSIR-National Aerospace Laboratories, Kodihalli, Bengaluru-560017, Ph;9880646735, Email: aanil@nal.res.in	
05	Mr. Abhijeeth Prahlad, Sai Shakthi Enclave, FF-9B, H.V Halli Road, Near SBI, BEML 5th Stage, Rajarajeswari Nagar, Bengalore -560098. PH: 8748827358 mail id: pabhibhar@gmail.com	

Sl. No.	NAME OF THE BOS MEMBERS (Internal)	SIGNATURE
06	Dr. Sudha Kamath M K Associate Professor & HoD Physics, Department of Physics, R V College of Engineering. Mysuru Road, Bengaluru-560059.	Sudha Kamath
07	Dr.T.Bhuvaneswara Babu, Professor, Department of Physics, R V College of Engineering. Mysuru Road, Bengaluru-560059.	Bhuvan 02/12/22
08	Dr. Avadhani D.N, Associate Professor, Department of Physics, R V College of Engineering. Mysuru Road, Bengaluru-560059.	2/12/22
09	Dr. Shireesha G, Associate Professor, Department of Physics, R V College of Engineering. Mysuru Road, Bengaluru-560059.	G. Shireesha 2/12/22
10	Dr. Karthik Shastry, Associate Professor, Department of Physics, R V College of Engineering. Mysuru Road, Bengaluru-560059.	leave of absence

DEPARTMENT OF PHYSICS

Proceedings: **05-12-2022**

Dr. Sudha Kamath, Chairperson of the BoS committee welcomed everyone present.

Sub. No.- 47 A To read and record the proceedings of 22nd Board of studies meeting held on 28-05-2022 and action taken report.

The chairperson briefed the members about proceedings of 22nd Board of studies meeting held on 28-05-2022 and action taken report thereon. As there were no comments from the members, the proceedings and the action taken were read and recorded.

Sub. No.- 47 B	Suggestion	Action taken
To discuss and approve I &II semester syllabi of 2022 scheme. (Stream wise)	Dr. Ramesh Thamankar mentioned about textural errors in the syllabi.	All the textural errors were rectified.
	Dr. Anil Kumar from CSIR-NAL suggested to incorporate Darcy's law and its applications, Renolds number and Bernoulli's principle and its applications.	Reynold's number is included in Mechanical stream syllabus and Bernoulli's principle included in Civil stream syllabus. However, Darcy's law and its applications are too high for the first-year students and hence not included.
	All the Internal members of BoS suggested to include more no of computer interfaced experiments.	40% of total no of experiments are made computer interfaced for Computer Science and Electrical stream and 20% for Mechanical and Civil stream.

The meeting ended with thanks to the Chair and committee members.

Sudha Kamath
5/12/22

Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

Date: 05.12.2022

Minutes of the 23rd BoS meeting held on 05-12-2022 at 10:30 am in the Physics department to discuss proposed syllabus for 2022 scheme I & II semester.

EXTERNAL Members: All members gave their feedback through mail.

1. Dr. Prashanth C Upadhya, Scientist, Laboratory for Electro-Optics Systems (LEOS), Indian Space Research Organisation (ISRO), Bengaluru. **(in-Absentia)**
2. Dr. Ramesh Thamankar, Associate Professor, Vellore Institute of Technology (VIT), Vellore, TN. **(in-Absentia)**
3. Dr. Basavaraj Angadi, Associate Professor, Bengaluru University, Bengaluru **(in-Absentia)**
4. Dr. Anil Kumar A, Principal Scientist, CSIR-NAL, Bengaluru. **(in-Absentia)**
5. Mr. Abhijith, Entrepreneur & Engineer, Bengaluru, **(in-Absentia)**

Members Present: INTERNAL

1. Dr. Sudha Kamath M K, Associate Professor & HoD, RV College of Engineering, Bengaluru. Sudha Kamath 5/12/22
2. Dr. Bhuvaneswara Babu T, Professor, Dept. of Physics, R.V. College of Engineering, Bengaluru. 05/12/22
3. Dr. Avadhani DN, Associate Professor, Dept. of Physics, R.V College of Engineering Bengaluru.
4. Dr. Shireesha G, Assistant Professor, Dept. of Physics, R.V. College of Engineering, Bengaluru. 5/12/22
5. Dr. Shubha S, Assistant Professor, Dept. of Physics, R.V. College of Engineering, Bengaluru. Shubha 5/12/22
6. Dr. Karthik Shastry, Assistant Professor, Dept. of Physics, R.V. College of Engineering, Bengaluru. -

Semester: I						
CONDENSED MATTER PHYSICS FOR ENGINEERS **Category: Applied Science Course** **Stream: Electronics (Common to EC, EE, EI & ET Programs)** **(Theory and Practice)**						
Course Code	:	22PHY12A		**CIE**	:	100 Marks
Credits: L:T:P	:	3:0:1		**SEE**	:	100 Marks
Total Hours	:	42 L+30P		**SEE Duration**	:	3 Hours

Unit-I	**08 Hrs**
Quantum Mechanics: de Broglie Hypothesis and Matter Waves, Phase Velocity and Group Velocity, Heisenberg's Uncertainty Principle and its application. **Wave Mechanics:** Wave Function, Time independent Schrodinger wave equation, Expectation value, Eigen functions and Eigen Values, Motion of a particle in a one-dimensional potential well of infinite depth, Numerical problems.	
Unit – II	**08 Hrs**
Basics of Solid-State Physics: **Electrical Conductivity in Metals:** Quantum free electron theory and failures. Band theory of solids, Fermi energy and Fermi level, density of states, carrier concentration in metals at 0K. **Electrical Conductivity in Semiconductor** Fermi level in intrinsic semiconductors, Expression for concentration of electrons in conduction band (derivation), Law of mass action, Electrical conductivity of a semiconductor (derivation), Extrinsic semiconductors: Variation of fermi level with temperature and doping in extrinsic semiconductor, Hall effect and Hall coefficient (derivation).	
Unit –III	**09 Hrs**
Lasers and Optical Fibers: **Lasers**: Characteristics of LASER, Interaction of radiation with matter, requisites of a Laser system. Construction and working of semiconductor laser. Application of Lasers in Defence and Laser Printing. **Optical Fibers:** Propagation mechanism, Numerical aperture derivation, Modes of propagation. Attenuation in fiber, Discussion of block diagram of Point-to-Point communication, Optical fiber sensor. Numerical problems.	
Unit –IV	**08 Hrs**
Semiconductor devices: **Diodes:** Direct and indirect band gap, Band gap engineering, P-N junction diode-forward and reverse bias, diode equation, V-I characteristic, Application: bridge rectifier, breakdown mechanism in diodes: Avalanche & Zener breakdown, Zener diode as voltage regulator. **Transistors:** Bi-junction polar transistor, V-I characteristics in Common Emitter, Common Base and Common Collector configuration, CE configuration as an amplifier. Numerical problems.	
Unit –V	**09 Hrs**
Dielectrics and Transducers: **Dielectric Properties:** Polar and non-polar dielectrics, Types of Polarization, internal fields in solid, Clausius-Mossotti equation (Derivation), solid, liquid and gaseous dielectrics. Application of dielectrics in transformers, Capacitors, Frequency dependency of dielectric constant, Electrical insulation – Dielectric breakdown Numerical problems. **Transducers**: Stress-Strain curve, moduli of elasticity, strain gauge, ultrasonic piezoelectric transducer, temperature transducer – Thermocouples. Numerical problems.	

Sudha Kamath
5/12/22

Course Outcomes: After completing the course, the students will be able to: -	
CO 1	Explain the phenomenon of laser, fundamentals of quantum mechanics applicable to Electronics engineering, basics of semiconducting and dielectric materials.
CO 2	Apply the knowledge of quantum mechanics in laser and semiconductors in engineering.
CO 3	Develop analytical thinking by solving numerical.
CO 4	Design & develop simulating models and validate with real time experimentation.

Reference Books	
1.	Grob's basic electronics, Mitchel E Schultz, McGrahill edtion, 10th edn, 2007, ISBN 978-0-07-3373874.
2.	A Textbook of Engineering Physics, M. N. Avadhanulu and P G Kshirsagar,, S. Chand publications, 2019, ISBN : 978-93-528-3399-3.
3.	Physics for Degree students, C.L. Arora and Dr. P. S. Hemne,S Chand, revised 2010, ISBN: 978-81-219-33506.
4.	Engineering Physics, R K Gaur and S L Gupta, Dhanpat Rai Publications, 2011, ISBN: 9788189928223.
5.	Solid state electronic devices, Ben G Streetman and Sanjay Kumar Banerjee, 6th edition, PHI learning, 2009, ISBN: 978-81-203-30207.

Laboratory Experiments (EE stream)
1. Wavelength of laser by diffraction.
2. Numerical aperture of an optical fiber.
3. Transistor characteristics.
4. Band gap of thermistor.
5. Hall coefficient experiment.
6. Black box experiment.
7. Four probe experiment.
8. Fermi Energy.
9. Charging & discharging of a capacitor.
10. Photo Diode.
11. Exp Eyes experiment: LCR
12. ExpEyes experiment: Wavelength of LED and I-V characteristics of Zener diode.

Sudha Kamath

Head of the Department of Physics
RV College of Engineering
Bangalore - 560 059

5/12/22

RUBRIC FOR THE CONTINUOUS INTERNAL EVALUATION (THEORY)		
#	COMPONENTS	MARKS
1.	**QUIZZES:** Quizzes will be conducted in online/offline mode. **TWO QUIZZES** will be conducted & Each Quiz will be evaluated for 10 Marks. **THE AVERAGE OF TWO QUIZZES WILL BE THE FINAL QUIZ MARKS.**	**10**
2.	**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). **THREE tests will be conducted**. Each test will be evaluated for **50 Marks**, adding upto 150 Marks. **FINAL TEST MARKS WILL BE REDUCED TO 30 MARKS.**	**30**
3.	**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study based teaching learning (10), Program specific requirements (10), Video based seminar/presentation/demonstration (10) **ADDING UPTO 30 MARKS.**	**30**
4.	**LAB:** Conduction of laboratory exercises, lab report, observation and analysis **(30 Marks)**, lab test **(10 Marks)** and Innovative Experiment/ Concept Design and Implementation **(10 Marks)** adding up to 50 Marks. **THE FINAL MARKS WILL BE REDUCED TO 30 MARKS**	**30**
	MAXIMUM MARKS FOR THE CIE THEORY	**100**

RUBRIC FOR SEMESTER END EXAMINATION (THEORY)		
Q. NO.	**CONTENTS**	**MARKS**
	PART A	
1	Objective type of questions covering entire syllabus	10
	PART B (Maximum of TWO Sub-divisions only)	
2	Unit 1 : (Compulsory)	14
3 & 4	Unit 2 : Question 3 or 4	14
5 & 6	Unit 3 : Question 5 or 6	14
7 & 8	Unit 4 : Question 7 or 8	14
9 & 10	Unit 5: Question 9 or 10	14
11	Lab Component (Compulsory)	20
	TOTAL	**100**

Sudha Kamath
5/12/22

Semester: I

CLASSICAL PHYSICS FOR ENGINEERS

Category: Applied Science Course

Stream: Mechanical (Common to AS, CH, IM & ME Programs)

(Theory and Practice)

Course Code	:	22PHY12B	**CIE**	:	100 Marks
Credits: L:T:P	:	3:0:1	**SEE**	:	100 Marks
Total Hours	:	42 L+30P	**SEE Duration**	:	3 Hours

Unit-I — 06 Hrs

Free, Damped and Forced Vibration:

Simple Harmonic motion (SHM), differential equation for SHM (No derivation), Spring mass and its applications.

Theory of damped oscillations (Derivation), Types of damping (Graphical Approach). Engineering applications of damped oscillations, Theory of forced oscillations (Qualitative), resonance and sharpness of resonance. Numerical problems.

Unit – II — 09Hrs

Elastic Properties of Materials:

Types of Stress and Strain, Stress, Strain equivalence relations, Relation between Elastic constants, Bending of beams: neutral surface and neutral axis, expression for bending moment of a beam: Single cantilever (derivation). Numerical problems.

Torsion of a Shaft: Expression for couple per unit twist of a solid shaft, torsion pendulum: expression for time period and rigidity modulus, Numerical problems.

Unit –III — 09 Hrs

Fundamentals of Thermodynamics:

Introduction to thermodynamics: Quasi – static process. Zeroth law of thermodynamics, Liquid, gas, resistance thermometers. Joule's experiment (equivalence between heat and work), Numerical problems.

First law of thermodynamics, work done in thermodynamic quasi static processes, Isothermal process, adiabatic process and cyclic process, Application of first law of thermodynamics for both closed system and Steady State System. Numerical problems.

Unit –IV — 09 Hrs

Basic concepts of Fluid Mechanics:

Definition of Fluid, concept of continuum, classification of fluids, Fluid Properties, Newton's Law of viscosity, Absolute and Kinematic viscosity, No slip condition, Vapour pressure and cavitation, Bulk Modulus and Compressibility, Ultrasonic interferometer. Surface tension and capillarity. Numerical problems.

Fundamentals of Fluid Flows:

Types of Fluid Flows, Stream line, Streak line and Path line. Continuity Equation in Integral form and three-dimension Cartesian coordinates. Numerical problems.

Unit –V — 09 Hrs

Material Characterization:

Mechanical Characterisation (Tensile and yield strength, Ductility, Toughness and Hardness), Optical Characterisation, current-Voltage (IV) characterisation, Surface characterisation (Roughness & Crystallinity, particle distribution and magnetic properties.

Instrumentation Techniques:

Principle, construction and working of X-ray Diffractometer, crystallite size determination by Scherrer equation, Principle, construction, working and applications of Atomic Force Microscopy (AFM), X-ray photoelectron spectroscopy (XPS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Numerical problems.

Sneha Kamath
Head of the Department of Physics
R V College of Engineering
Bangalore - 560059
5/12/22

Course Outcomes: After completing the course, the students will be able to: -	
CO 1	Explain the concepts in oscillations, elasticity, thermodynamics, fluid mechanics & instrumentation techniques.
CO 2	Apply the fundamentals of oscillations, elasticity, thermodynamics, fluid mechanics and material characterization techniques to engineering applications.
CO 3	Develop analytical thinking by solving numerical.
CO 4	Design & develop simulating models and validate with real time experimentation.

Reference Books	
1.	Basic & Applied Thermodynamics, P K Nag, McGraw Hill Education, 2nd Edition, 2017, ISBN 10-0070151318, 13-978-0070151314.
2.	Fluid Mechanics: Fundamentals and Applications, John. M. CimbalaYunus A. Cengel, McGraw-Hill Publications, 4thEdition, 2019, ISBN 10-9353166217, 13-978-9353166212.
3.	A Textbook of Engineering Physics, M. N. Avadhanulu and P G Kshirsagar, S. Chand publications, 2019, ISBN : 978-93-528-3399-3.
4.	Physics for Degree students, C.L. Arora and Dr. P. S. Hemne, S Chand, revised 2010, ISBN: 9788121933506.
5.	Engineering Physics, R K Gaur and S L Gupta, Dhanpat Rai Publications, 2011, ISBN: 9788189928223.

Laboratory Experiments (ME stream)
1. Spring constant experiment using expEYES17.
2. Moment of Inertia of irregular body and rigidity modulus by Torsion pendulum.
3. Young's modulus by Single cantilever.
4. Young's modulus by Uniform bending.
5. Ultrasonic Interferometer.
6. Wavelength of laser by diffraction.
7. Forced mechanical Oscillations and Resonance.
8. Fermi Energy of copper
9. Four Probe.
10. Newton's rings.
11. Exp Eyes experiment: LCR

RUBRIC FOR THE CONTINUOUS INTERNAL EVALUATION (THEORY)		
#	COMPONENTS	MARKS
1.	**QUIZZES:** Quizzes will be conducted in online/offline mode. **TWO QUIZZES** will be conducted & Each Quiz will be evaluated for 10 Marks. **THE AVERAGE OF TWO QUIZZES WILL BE THE FINAL QUIZ MARKS.**	**10**
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	MAXIMUM MARKS FOR THE CIE THEORY	**100**

RUBRIC FOR SEMESTER END EXAMINATION (THEORY)		
Q. NO.	**CONTENTS**	**MARKS**
	PART A	
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	PART B (Maximum of TWO Sub-divisions only)	
2	Unit 1 : (Compulsory)	14
3 & 4	Unit 2 : Question 3 or 4	14
5 & 6	Unit 3 : Question 5 or 6	14
7 & 8	Unit 4 : Question 7 or 8	14
9 & 10	Unit 5 : Question 9 or 10	14
11	Lab Component (Compulsory)	20
	TOTAL	**100**

Semester: II

QUANTUM PHYSICS FOR ENGINEERS

Category: Applied Science Course

Stream: Computer Science (Common to AI, BT, CS, CY, CD & IS Programs)

(Theory and Practice)

Course Code	:	22PHY22C	**CIE**	:	100 Marks
Credits: L:T:P	:	3:0:1	**SEE**	:	100 Marks
Total Hours	:	42 L+30P	**SEE Duration**	:	3 Hours

Unit-I — **08 Hrs**

Quantum Mechanics:
de Broglie Hypothesis and Matter Waves, Phase Velocity and Group Velocity, Heisenberg's Uncertainty Principle, and its application.

Wave Mechanics: Wave Function, Time independent Schrodinger wave equation, Expectation value, Eigen functions and Eigen Values, Motion of a particle in a one-dimensional potential well of infinite depth, Numerical problems.

Unit – II — **08 Hrs**

Principle of Quantum Computation:

Matric Mechanics:
Wave Function in Ket Notation: Matrix form of wave function, Identity operator, determination of $I\,|\,0>$ and $I\,|\,1>$, Pauli matrices and its operation on 0 and 1 states, mention of conjugate and transpose, unitary matrix U, Examples: Row and Column Matrices and their multiplication (Inner Product), Probability, Orthogonality.

Principles of Quantum information and Quantum Computing:
Introduction to Quantum Computing, Moore's law and its end. Single particle quantum interference, classical and quantum information comparison. Difference between classical and quantum computing, quantum superposition and the concept of qubit.

Properties of qubit: Mathematical representation, summation of probabilities, representation of qubit by Bloch sphere.

Quantum Gates: Single qubit gates: Quantum not gate, Pauli – Z gate, Hadamard gate, Pauli matrices, Phase gate (S gate), T gate. Multiple qubit gates: controlled gate, CNOT gate (discuss for 4 different input states)

Unit –III — **09 Hrs**

Lasers and Optical Fibers:

Lasers:
Characteristics of LASER, Interaction of radiation with matter, requisites of a Laser system. Construction and working of semiconductor laser. Application of laser: Bar Code scanner, Laser Printer, Laser Cooling, Numerical problems.

Optical Fibers:
Propagation mechanism, Numerical aperture derivation, Modes of propagation. Attenuation in fiber, Discussion of block diagram of Point-to-Point communication, Optical fiber sensor. Numerical problems.

Unit –IV — **08 Hrs**

Electrical Conductivity in Solids:
Postulates of Classical free electron theory (CFET), Concept of Phonon, Matheissen's rule. Quantum free electron theory (QFET), Density of states in three dimensions (qualitative) and Fermi factor. Fermi energy: variation of Fermi factor with temperature.

Band theory of solids (qualitative approach), electron concentration in metals at 0K. Intrinsic semiconductors: electronic concentration in conduction band and hole concentration (qualitative), Fermi level in intrinsic semiconductors, Extrinsic semiconductors: Variation of carrier concentration with temperature and Fermi energy with doping, Hall effect for metals and semiconductors, Numerical problems.

Sneha Kamath
5/12/22

Unit –V	09 Hrs
Super conductivity: Introduction to superconductors, temperature dependence of resistivity, Meissner effect, critical current, types of superconductors, temperature dependence of critical field. **BCS theory (qualitative)**, Quantum tunneling, High temperature superconductivity, Josephson junction, DC and AC SQUIDs (qualitative), Applications in quantum computing, Numerical problems.	

Course Outcomes: After completing the course, the students will be able to; -	
CO 1	Explain the fundamentals of quantum mechanics applicable to computer science engineering, basics of electrical and superconducting materials.
CO 2	Apply the knowledge of quantum mechanics in lasers, semiconductors and super conductor devices for engineering applications.
CO 3	Develop analytical thinking by solving numerical.
CO 4	Design & develop simulating models and validate with real time experimentation.

Reference Books	
1.	Physics for Engineers, M R Srinivasan, New Age International Publishers, 2011, ISBN: 978-81-224-2603-8.
2.	A Textbook of Engineering Physics, M. N. Avadhanulu and P G Kshirsagar, 2019, S. Chand publications, ISBN : 978-93-528-3399-3.
3.	Physics for Degree students, C.L. Arora and Dr. P. S. Hemne, S Chand, revised 2010, ISBN: 9788121933506.
4.	Engineering Physics, R K Gaur and S L Gupta, DhanpatRai Publications, 2011, ISBN: 9788189928223.

Laboratory Experiments (CS Stream)
1. Wavelength of laser by diffraction.
2. Numerical aperture of an optical fiber.
3. Transistor characteristics.
4. Band gap of thermistor.
5. Hall coefficient experiment.
6. Black box experiment.
7. Four probe experiment.
8. Fermi Energy.
9. Charging & discharging of a capacitor.
10. Photo Diode.
11. Exp Eyes experiment: LCR
12. Exp Eyes experiment: Wavelength of LED and I- V characteristics of Zener diode.

Sudha Kamath
5/12/22
Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

RUBRIC FOR THE CONTINUOUS INTERNAL EVALUATION (THEORY)		
#	COMPONENTS	MARKS
1.	**QUIZZES:** Quizzes will be conducted in online/offline mode. **TWO QUIZZES** will be conducted & Each Quiz will be evaluated for 10 Marks. **THE AVERAGE OF TWO QUIZZES WILL BE THE FINAL QUIZ MARKS.**	**10**
2.	**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). **THREE tests will be conducted**. Each test will be evaluated for **50 Marks**, adding upto 150 Marks. **FINAL TEST MARKS WILL BE REDUCED TO 30 MARKS.**	**30**
3.	**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study based teaching learning (10), Program specific requirements (10), Video based seminar/presentation/demonstration (10) **ADDING UPTO 30 MARKS**.	**30**
4.	**LAB:** Conduction of laboratory exercises, lab report, observation and analysis **(30 Marks)**, lab test **(10 Marks)** and Innovative Experiment/ Concept Design and Implementation **(10 Marks)** adding up to 50 Marks. **THE FINAL MARKS WILL BE REDUCED TO 30 MARKS**	**30**
	MAXIMUM MARKS FOR THE CIE THEORY	**100**

RUBRIC FOR SEMESTER END EXAMINATION (THEORY)		
Q. NO.	**CONTENTS**	**MARKS**
	PART A	
1	Objective type of questions covering entire syllabus	10
	PART B (Maximum of TWO Sub-divisions only)	
2	Unit 1 : (Compulsory)	14
3 & 4	Unit 2 : Question 3 or 4	14
5 & 6	Unit 3 : Question 5 or 6	14
7 & 8	Unit 4 : Question 7 or 8	14
9 & 10	Unit 5: Question 9 or 10	14
11	Lab Component (Compulsory)	20
	TOTAL	**100**

Sneha Kannath
5/12/22

Semester: II						
APPLIED PHYSICS FOR ENGINEERS **Category: Applied Science Course** **Stream: Civil (Only to CV Program)** **(Theory and Practice)**						
Course Code	:	22PHY22D		**CIE**	:	100 Marks
Credits: L:T:P	:	3:0:1		**SEE**	:	100 Marks
Total Hours	:	42 L+30P		**SEE Duration**	:	3 Hours

Unit-I	**08 Hrs**
Oscillations: Simple Harmonic Motion (SHM), differential equation for SHM (No derivation), Sprig mass and its applications. Theory of damped oscillations (Derivation), Types of damping (Graphical Approach). Engineering applications of damped oscillations, Theory of forced oscillations (Qualitative), resonance and sharpness of resonance. Numerical problems.	
Unit – II	**09 Hrs**
Elastic properties of materials: Stress-Strain Curve, Stress hardening and softening. Elastic Moduli, Poisson's ratio and its limiting values. Relation among elastic constants (qualitative), Bending of beams: neutral surface and neutral axis, expression for bending moment of a beam, Single cantilever (derivation). **Torsion of a cylinder:** expression for couple per unit twist of a solid cylinder, torsion pendulum: expression for time period and rigidity modulus. Failures of engineering materials – ductile fracture, brittle fracture, stress concentration, fatigue and factors affecting fatigue (only qualitative explanation) Numerical problems.	
Unit –III	**08 Hrs**
Kinematics: Displacement, average velocity, instantaneous velocity, speed, acceleration, average acceleration, variable acceleration, acceleration due to gravity, Newton's law of motion, rectilinear motion and numerical problems, curvilinear motion, superelevation, projectile motion, relative motion, numerical problems, motion under gravity, numerical problems. **Kinetics:** D 'Alembert's principle and its application in-plane motion and connected bodies including pulleys.	
Unit –IV	**09 Hrs**
Fluid Mechanics: Definition of fluid and its properties, Fluid statics, buoyancy, Poiseuille's equation, determination of co-efficient of viscosity of liquid by Poiseuille's flow method. Error and correction applied to Poiseuille's formula. Variation in viscosity of liquids and gases with temperature. Bernoulli's theorem and its application. Description of fluids (qualitative). Type of fluid flows- stream line, streak line, path line, turbulence. Numerical problems.	
Unit –V	**08 Hrs**
Fundamentals of Sensors: Introduction to Sensors, Sensor systems and overview of sensor technologies, Classification of sensors, Sensor's characteristics. **Sensors: principles & Applications**: Temperature sensors: RTD, Thermistor, Thermocouple. Vibration sensor, Optical fiber sensor for structural health monitoring, Strain gauge sensor, Piezo electric sensors for energy harvesting.	

Sudha Kamath
5/12/22
Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059

Course Outcomes: After completing the course, the students will be able to	
CO 1	Explain the concepts in oscillations, elasticity, kinematics, Fluid dynamics and sensor techniques.
CO 2	Apply the fundamentals of oscillations, elasticity, kinematics, fluid dynamics and sensor techniques to Civil engineering applications.
CO 3	Develop analytical thinking by solving numerical.
CO 4	Design & develop simulating models and validate with real time experimentation.

Reference Books	
1.	A Textbook of Engineering Physics, M N Avadhanulu, P G Kshirsagar and TVS Arun Murthy, S Chand and Company Limited, New Delhi, Revised Edition 2019,ISBN: 978-93-528-3399-3.
2.	Jacob Fraden, Handbook of Modern Sensors: Physics, Designs, and Applications, PHI Publication, 5th Edition 2016, ISBN: 978-1-4419-6465-6.
3.	Elements of Properties of matter, D S Mathur, S Chand and Company PVT LTD , 2010, ISBN-13:978-8121908153.
4.	Engineering Physics, Gaur and Gupta, Dhanpat Rai Publications LTD, 2012, ISBN-13: 978-8189928223.
5.	Physics for Degree students, C L Arora and P S Hemne, S Chand and Company PVT. LTD, 2016, ISBN: 978-81-219-4059-7.
6.	Engineering Physics, Hitendra K Mallik and A K Singh, Tata McGraw Hill Education, 2010, ISBN 978-0-07-067153-9.

Laboratory Experiments (CV stream)
1. Spring constant experiment using expEYES17.
2. Moment of Inertia of irregular body and rigidity modulus by Torsion pendulum.
3. Young's modulus by Single cantilever.
4. Young's modulus by Uniform bending.
5. Ultrasonic Interferometer.
6. Wavelength of laser by diffraction.
7. Forced mechanical Oscillations and Resonance.
8. Fermi Energy of Copper.
9. Four Probe Experiment.
10. Newton's rings.
11. Exp Eyes experiment: LCR

Sudha Kamath
5/12/22

RUBRIC FOR THE CONTINUOUS INTERNAL EVALUATION (THEORY)		
#	COMPONENTS	MARKS
1.	**QUIZZES:** Quizzes will be conducted in online/offline mode. **TWO QUIZZES** will be conducted & Each Quiz will be evaluated for 10 Marks. **THE AVERAGE OF TWO QUIZZES WILL BE THE FINAL QUIZ MARKS.**	**10**
2.	**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). **THREE tests will be conducted**. Each test will be evaluated for **50 Marks**, adding upto 150 Marks. **FINAL TEST MARKS WILL BE REDUCED TO 30 MARKS.**	**30**
3.	**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study based teaching learning (10), Program specific requirements (10), Video based seminar/presentation/demonstration (10) **ADDING UPTO 30 MARKS.**	**30**
4.	**LAB:** Conduction of laboratory exercises, lab report, observation and analysis **(30 Marks)**, lab test **(10 Marks)** and Innovative Experiment/ Concept Design and Implementation **(10 Marks)** adding up to 50 Marks. **THE FINAL MARKS WILL BE REDUCED TO 30 MARKS**	**30**
	MAXIMUM MARKS FOR THE CIE THEORY	**100**

RUBRIC FOR SEMESTER END EXAMINATION (THEORY)		
Q. NO.	**CONTENTS**	**MARKS**
	PART A	
1	Objective type of questions covering entire syllabus	10
	PART B (Maximum of TWO Sub-divisions only)	
2	Unit 1 : (Compulsory)	14
3 & 4	Unit 2 : Question 3 or 4	14
5 & 6	Unit 3 : Question 5 or 6	14
7 & 8	Unit 4 : Question 7 or 8	14
9 & 10	Unit 5: Question 9 or 10	14
11	Lab Component (Compulsory)	20
	TOTAL	**100**

Sudha Kamath
Head of the Department of Physics
R V College of Engineering
Bangalore - 560 059
5/12/22

R.V. COLLEGE OF ENGINEERING
(An Autonomous Institution under VTU, Belgaum)

DEPARTMENT OF CHEMISTRY

Date: 26/06/2018

To,
Principal
RVCE, Bengaluru

Sub: Requesting permission to conduct BOS meeting on Wednesday, 4th July, 2018.

Sir,
We are planning to conduct BOS meeting in Chemistry Department on **Wednesday, 4th July, 2018**, to discuss and finalize the Engineering Chemistry syllabus for first year engineering students. I request you to kindly give the permission to conduct the meeting.

26.06.2018
HOD-Chemistry

Head, Dept. of Chemistry
RV College of Engineering
Bangalore-560 059

permitted
26/6/18

R.V. COLLEGE OF ENGINEERING
(An Autonomous Institution under VTU, Belgaum)
DEPARTMENT OF CHEMISTRY

Ref: RVCE/CHEM/BOS/2017-18

Date: 26.06.2018

MEETING NOTICE

Dear Sir,

I am Pleased to invite you for the meeting of members of Board of Studies (BOS) on **Wednesday, 4th July 2018 at 10.00 AM** in the Department of Chemistry, R V College of Engineering, Bangalore. The agenda of meeting is as follows.

1. Finalization of I year Engineering Chemistry Syllabus for 2018 scheme.
2. Finalization of laboratory experiments for 2018 scheme.
3. Any other academic matters.

Kindly request you to be a part of this meeting as your inputs are valuable to us.

Thanking you,

26.06.2018

Yours faithfully,
Dr. Raviraj Kusanur
Chairman, BOS Chemistry

Head, Dept. of Chemistry
RV College of Engineering
Bangalore-560 059

Copy to,

1 Dr. B M Nagabhushana, Prof MSRIT
2 Dr. Dharmaprakash M S, Prof BMSCE
3 Dr. K R Prabhu, Prof IISc
4 Dr. Vijaya Kumar Hulikal, Bioorganics Ltd

R.V. COLLEGE OF ENGINEERING
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DEPARTMENT OF CHEMISTRY

BOS PROCEEDINGS

Proceeding of Board of studies meeting held on 4.7.2018 at 10.00 am in department of Chemistry, RVCE, Bengaluru.

Agenda:

1. Finalization of I year Engineering chemistry syllabus for 2018 scheme
2. Finalization of laboratory experiments for 2018
3. Any other academic matters.

Members present:

1. Dr. Raviraj A Kusanur, Associate Professor and Head Dept of Chemistry.
2. Dr. Satyanarayana S, Professor, Chemistry Department.
3. Dr. K. Natarajan, Professor, Chemistry Department.
4. Mr. Mahesh. R, Assistant Professor, Chemistry Department.
5. Dr. Divakara S. G.
6. Dr. Sridharan M, Assistant Professor, Chemistry Department.
7. Dr. Vishnumurthy K A, Assistant Professor, Chemistry Department.

Subject Experts from outside the college nominated by Academic Council:

1. Dr. Dharma Prakash M.S, Professor in Chemistry, BMSCE, Bangalore.

Representative from Industry:

1. Dr. Vijaya Kumar Hulikal, BioOrganics & Applied Materials Pvt. Ltd.

Minutes of the meeting:

I. **Dr. Raviraj A Kusanur**, Chairman-BOS welcomed all the members and introduced external members.

II. The following **suggestions** have been received by the **BOS members** for the revised syllabus.

1. CLOs are rearranged according to revised Bloom's taxonomy.
2. In Unit-I, to include the water quality parameter according to WHO standards.
3. In Unit II, under secondary battery $LiCoO_2$ battery is included.
4. In Unit-III, Phophating and anodizing subtopics are suggested to incorporate in corrosion control.
5. In Unit-IV,carbon nanotubes synthesis by CVD method was suggested to change modified CVD method.
6. In Unit-V, synthesis of polycaprolactum was asked to remove and more specify on polylactic acid.
7. Course outcomes are revised as per suggestions.
8. In engineering chemistry lab component, title of the first experiment was suggested to change under new title.
9. In 8^{th} experiment, instead of MgO synthesis, ZnO was suggested to incorporate because of its vast applications.
10. Under instrumental analysis, Flame photometry to be done for saline solutions because of its importance in medicine industry.

III. Suggestions by Principal Dr. Subramanya.K.

1. Incorporation of innovative methods in teaching for revised syllabus.
2. Incorporation of research culture among the students by introducing new type of self-learning and research oriented methodologies.

External BOS members are given valuable inputs and appreciated the syllabus as it contains introduction to applications of latest technologies.

IV. **Prof. Satyanarayana. S** concluded the session with vote thanks.

R.V. COLLEGE OF ENGINEERING
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DEPARTMENT OF CHEMISTRY

BOS PROCEEDINGS

04.07.2018

Signature of the members present

External members

Sl No	Name of the Member	Signature
1	Dr. Dharma Prakash M.S	4/7/18
2	Dr. Vijaya Kumar Hulikal	4/7/18

Internal Members

Sl No	Name of the Member	Signature
1	Dr. Raviraj A Kusanur	
2	Dr. Satyanarayana S	
3	Dr. K. Natarajan	4/7/18
4	Mr. Mahesh. R	4/7/18
5	Dr.Diwakara.S.G	4/7/18
6	Dr. Sridharan M	04/07/2018
7	Dr. Vishnumurthy K A	4/7/18

R.V. COLLEGE OF ENGINEERING

(An Autonomous Institution under VTU, Belgaum)

DEPARTMENT OF CHEMISTRY

Ref: RVCE/CHEM/ /2019-20

Date: 03.05.2019

To,
Principal
RVCE, Bengaluru

Sub- Requesting permission to conduct BOS meeting on Monday 06.05.2019

Sir,

We are conducting the **Board of studies meeting in chemistry department on Monday 06.05.2019** to discuss and finalize the **Technical Chemistry** syllabus for **III semester chemical engineering students**. I kindly request you to give the permission for the same.

Thanking you,

Permitted

03.05.2019

HOD Chemistry

Head, Dept. of Chemistry
RV College of Engineering
Bangalore-560 059

R.V. COLLEGE OF ENGINEERING

(An Autonomous Institution under VTU, Belagavi)

DEPARTMENT OF CHEMISTRY

Ref: RVCE/CHEM/BOS/2019-20

Date: 03.05.2019

MEETING NOTICE

Dear Sir/Madam,

I am pleased to invite you for the meeting of members of Board of Studies (BOS) on **Monday, 6th May 2019 at 11.00 AM** in the Department of Chemistry, R V College of Engineering, Bangalore. The agenda of meeting is as follows.

Agenda:

Sub No-4. To discuss and record Technical chemistry syllabus for III semester chemical engineering for 2018 scheme.

Sub No-5. Finalization of laboratory experiments of technical chemistry course for 2018 scheme.

Sub No-6. Finalization of global elective courses offered for V, VI and VII semester BE in 2016 scheme.

Sub No-7. Ratification of global elective course 18CHY2G08 (Composite materials science and Engineering) offered to II semester M Tech students.

Sub No-8. Any other academic matters.

Kindly request you to be a part of this meeting as your inputs are valuable to us.

Thanking you,

03.05.2019

Yours faithfully,

Dr. Raviraj Kusanur

Chairman, BOS Chemistry

Copy To,

1. Dr. Dharmaprakash, Professor, BMSCE, Bengaluru
2. Dr. Mahesh B, Associate Professor, JSSATE, Bengaluru
3. Dr. Gururaj M S, Scientist, Merck Life Sciences, Bengaluru

Minutes of the meeting:

I. **Dr. Raviraj Kusanur**, Chairman-BOS welcomed all the members and introduced external members and briefed about the revised syllabus.

II. The following **suggestions** have been received by the **BOS members** for the revised syllabus of Technical Chemistry (18CH33) and global electives courses.

1. In Unit I, Effects of reagents on environment and remedial measures should be included.
2. In Unit II, Active methylene compounds should be taught before Heterocyclic compounds.
3. In Unit III, Synthesis of Alizarin & Indigo dyes also should be taught along with other dyes.
4. In Unit V, in medicinal applications, specific co-ordination compounds should be discussed.
5. In lab component, title of experiment 1, needs to be corrected.
6. Experiment no 9 & 10, suggested changes in the titles, i.e to preparation of cobalt (II) complex and Nickel (II) complexes.
7. CO-PO mapping suggested CO2-PO12 (M) and CO4-PO3 (M)
8. Finalization of global elective courses offered to V, VI & VII semesters for 2016 scheme are done and the members suggested giving the ready course material to students. The courses discussed are (i) Corrosion science and engineering 16GE5XX (ii) Advanced and functional materials for green energy applications 16GE6XX (iii) Materials for advanced technology and spectroscopic characterization 16GE7XX.
9. The areas to propose global elective courses for 2018 scheme was discussed and the members suggested few important courses on food technology, material science and characterization, organic materials, energy etc. which are useful for all the programs of engineering.
10. Ratification of global elective course **18CHY2G08** (Composite materials science and Engineering) offered to M Tech II semester is done.
11. In other academic matters external BOS members suggested that in **18CH12/22** (Engineering Chemistry) syllabus taught for I year engineering students, one more experiment on Viscosity measurement of a polymer to determine its average molecular mass can be included.
12. The BOS members also strongly felt that introduction of one more course in **Physical Chemistry** is very much essential for **Chemical Engineering students**.

External BOS members appreciated the syllabus all courses as they contain introduction to applications of latest technologies and full fills the industrial needs.

The meeting concluded with vote of thanks by BOS chairman.

R.V. COLLEGE OF ENGINEERING
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DEPARTMENT OF CHEMISTRY

BOS PROCEEDINGS

6.5.2019

Signature of the members present

External members

Sl No	Name of the Member	Signature
1	Dr. Dharma Prakash M.S	6/5/19
2	Dr. B Mahesh	06-5-19

Internal Members

Sl No	Name of the Member	Signature
1	Dr. Raviraj Kusanur	6/5/19
2	Dr. Satyanarayana S	
3	Dr. Mahesh. R	6/5/19
4	Dr. Shaaman M P	
6	Dr. Sridharan M	06/05/2019
7	Dr. Swarna M Patra	6-5-19

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New Delhi.
And NBA, New Delhi

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DEPARTMENT OF CHEMISTRY

Date: 18.08.2021

To,
Principal
RVCE, Bengaluru

Sub- Requesting permission to conduct BOS meeting on Saturday 21.08.2021, through online.

Sir,

We are conducting the **Board of studies meeting through online on Saturday 21.08.2021, at 3.00 PM** (Through online mode) to discuss on **revision of Engineering chemistry syllabus and implementation of NEP 2020**. I kindly request you to give the permission for the same.

Thanking you,

Permitted
18/8

18.08.2021
HOD Chemistry
Head, Dept. of Chemistry
RV College of Engineering
Bengaluru - 560 059

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by NAAC, Bengaluru

DEPARTMENT OF CHEMISTRY

Ref: RVCE/CHEM/BOS/2020-21

Date: 19.08.2021

MEETING NOTICE

Dear Sir/Madam,

I am pleased to invite you for the meeting of members of Board of Studies (BOS) on Saturday, **21 August 2021 at 3.00 PM** (Online). The agenda of meeting is as follows.

9. To record and finalize Engineering Chemistry Syllabus (Theory)
10. To discuss and finalise pattern of CIE, SEE and Experiential learning
11. Discussion and finalization of laboratory experiments.
12. Discussion on content delivery

Kindly request you to be a part of this meeting as your inputs are valuable to us.

Thanking you,

19/08

Yours faithfully,
Dr. Raviraj Kusanur
Chairman, BOS Chemistry

Copy to,

1. Dr. Krishna Bhat, NITK Suratkal
2. Dr. Dharmaprakash M S, BMSCE
3. Dr. Mahesh B, JSSATE
4. Dr. Gururaj M S, Merck Life Sciences

RV COLLEGE OF ENGINEERING®
BENGALURU – 560 059
Department of Chemistry

Minutes of BoS Meeting

Minutes of meeting held on Saturday, 21st 2021

Agenda	To record and finalise Engineering chemistry Syllabus for 2021 scheme
Date	21.08.2021
Time	3.00 pm
Venue	Virtual mode https://rvce.webex.com/rvce/j.php?MTID=m15ed3d64ca722338d48467b6bd6a1971

Members Present:

#	Name of the faculty	Designation	Dept.	Signature
1.	Dr. Raviraj Kusanur	Chairman BoS and Associate Professor	Dept Chemistry RVCE	
2.	Dr. Krishan Bhat	Professor	Dept Chemistry, NITK Siratkal	Attended online
3.	Dr. Gururaj M Shivashimpi	Scientist,	Merck Life sciences, Bangalore	Attended online
4.	Dr. Dharmaprakash M S	Professor	Dept Chemistry, BMSCE, Bangalore	Attended online
5.	Dr. Mahesh B	Professor	Dept Chemistry, JSSATE, Bangalore	Attended online.
6.	Dr. S Satyanarayana	Professor	Dept Chemistry RVCE	
7.	Dr. Natarajan K	Professor	Dept Chemistry RVCE	
8.	Dr. Mahesh R	Asst Professor	Dept Chemistry RVCE	
9.	Dr. Manjunatha C	Asst Professor	Dept Chemistry RVCE	
10.	Dr. Divakara S G	Asst Professor	Dept Chemistry RVCE	
11.	Dr. Sham Aan M P	Asst Professor	Dept Chemistry RVCE	
12.	Dr. Sridharan M	Asst Professor	Dept Chemistry RVCE	
13.	Dr. Swarna M Patra	Asst Professor	Dept Chemistry RVCE	
14.	Dr. Vishnumurthy K A	Asst Professor	Dept Chemistry RVCE	

Dr. Raviraj Kusanur, Chairman of BOS- Chemistry welcomed all the members and explaind the procees of curriculum revision inline with NEP-2020.

Dr. Mahesh R presented the syllabus

The following points were discussed:

Agenda #	Discussions and Resolutions
09	To record and finalize Engineering Chemistry Syllabus (Theory)

- In Unit-I Dr. Krishna Bhat suggested the possibility of including anodic and cathodic inhibitors. But because of time constraints that cannot be included.
- In Unit-II No changes with respect to contents were suggested and the contents of the module were accepted by the BOS members.
- In Unit-III Prof DKB and Prof. DP suggested to include structure property relationship of polymers.
- In Unit-IV, Dr. Gururaj suggested to include Perovskite solar cells.
- In Unit-V, Prof. DKB and Prof. DP suggested to include preparation of semiconductor wafers. It may be used for all circuit branches (VLSI)
- Dr. Mahesh suggested to shift smart packaging materials from unit-V to Unit-III.
- In Unit-IV of non circuit branch syllabus, Prof. DKB suggested to include Catalytic cracking can be added.
- In Unit-V, Dr. Gururaj suggested to add BOD.
- Prof. Mahesh B suggested to add text book written by S S Dhara and Shashi Chawla in list of text books which covers most of the syllabus in both the syllabus.
- Prof. DKB suggested to include one e-book on nano materials in the list.
- Prof. DKB suggested to change the CO-4 by including "technology and real life".

Agenda #	Discussions and Resolutions
10	To discuss and finalise pattern of CIE, SEE and Experential learning

- No changes with respect to CIE, SEE and Experential learning were suggested and accepted by the BOS members.

Agenda #	Discussions and Resolutions
11	Discussion and finalization of laboratory experiments
• Prof. DKB suggested to include an experiment on synthesis of nano materials in the list of experiments • All other experiments are accepted by the BoS members. • BoS members suggested to prepare the laboratory manual.	

Agenda #	Discussions and Resolutions
12	Discussion on content delivery
• Dr. Swarna Patra presented the content delivery. • Prof. Mahesh B, mentioned on Research based pedagogy, to give the topic for group of students • Prof DKB mentioned on Flipped class, Concept mapping, mind mapping	

Concluding remarks by External BoS members,

- Prof. DKrishna Bhat, Fair enough and good enough.
- Prof. Mahesh B, it is road map to VTU syllabus
- Pro. Dharma Prakash, Good syllabus and mode of content delivery

All the external members appreciated both modules of syllabus and congratulated the team work.

Dr. Raviraj Kusanur, Chairman - BOS Chemistry proposed vote of thanks and meeting was concluded at 4.30pm.

****

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Approved by AICTE, New Delhi

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DEPARTMENT OF CHEMISTRY

Date: 16.03.2022

To,
Principal
RVCE, Bangalore

Sub- Requesting permission to conduct BOS meeting on Friday 18.03.2022, through online.

Sir,

We are conducting the **Board of studies meeting on Friday 18.03.2022, at 2.30 PM** (Through online mode) to discuss on **revision of Technical chemistry (21CH33) syllabus** for III semester Chemical Engineering. I kindly request you to give the permission for the same.

Thanking you,

permitted
16/3

16.3.22
HOD Chemistry
Head, Dept. of Chemistry
RV College of Engineering
Bengaluru - 560 059

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Approved by AICTE, New Delhi

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DEPARTMENT OF CHEMISTRY

Ref: No: RVE/CHE/ /2022

Date: 17.03.2022

To
The principal
R.V.C.E.,
BANGALORE.

Dear Sir,

Sub: Honorarium to the External BoS members-reg.

We are conducting BOS meeting through to finalize the Technical Chemistry Syllabus on **Friday 18.03.2022.** Kindly request you to sanction **Rs.8,000/-** towards honorarium for the BoS members

Thanking you

17/03/2022

HOD Chemistry

Head, Dept. of Chemistry
RV College of Engineering
Bengaluru - 560 059

Enclosures:

1. List of BoS Members.

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Approved by AICTE, New Delhi

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DEPARTMENT OF CHEMISTRY

Ref: RVCE/CHEM/BOS/2021-22 **Date: 16.03.2022**

MEETING NOTICE

Dear Sir/Madam,

I am pleased to invite you for the meeting of members of Board of Studies (BOS) on Friday**, 18 March 2022 at 2.30 PM** (Online). The agenda of meeting is as follows.

13. To discuss and record Technical Chemistry syllabus for III semester Chemical Engineering students for 2021 scheme.
14. Discussion and finalization of laboratory experiments

Kindly request you to be a part of this meeting as your inputs are valuable to us.

Thanking you,

16/03/22

Yours faithfully,
Dr. Raviraj Kusanur
Chairman, BOS Chemistry

Chairman
BoE in Chemistry
R V. College of Engineering
Mysore Road, Bengaluru-5

Copy to,

1. Dr. Krishna Bhat, NITK Suratkal
2. Dr. Dharmaprakash M S, BMSCE
3. Dr. Mahesh B, JSSATE
4. Dr. Gururaj M S, Merck Life Sciences

DEPARTMENT OF CHEMISTRY

Minutes of BOS meeting held on Friday, 18 2022

Agenda	To record and finalize technical chemistry Syllabus for III Semester Chemical Engineering students (2021 scheme)
Date	18.03.2022
Time	2.30 pm
Venue	Virtual mode https://rvce.webex.com/rvce/j.php?MTID=m7c8abddf7a6d41b9ca797b0af1bcc0be

External Members Present				
#	Name of the member	Designation	Department	Signature
1	Dr. D Krishna Bhat	Professor	Dept of Chemistry, NITK Suratkal	Attended Online
2	Dr. Gururaj Shivashimpi	Scientist	Merck Life Sciences, Bangalore	
3	Dr. M S Dharma Prakash	Professor	Dept of Chemistry BMSCE, Bangalore	
4	Dr. B Mahesh	Assoc Prof	Dept of Chemistry JSSATE, Bangalore	
Internal Members Present				
1	Dr. Raviraj Kusanur	Assoc Prof & Chairman BoS	Dept of Chemistry, RVCE, Bangalore	
2	Dr. S Satyanarayana	Professor	Dept of Chemistry, RVCE, Bangalore	
3	Dr. Manjunatha C	Asst Prof	Dept of Chemistry, RVCE, Bangalore	
4	Dr. Divakara S G	Asst Prof	Dept of Chemistry, RVCE, Bangalore	
5	Dr. Vishnumurthy K A	Asst Prof	Dept of Chemistry, RVCE, Bangalore	

Dr. Raviraj Kusanur, Chairman of BOS- Chemistry welcomed all the members and explained the process of curriculum revision.
The following points were discussed:

Agenda #	Discussions and Resolutions
13	To record and finalize Technical Chemistry Syllabus (Theory)

- In Unit-I Dr. Krishna Bhat suggested the possibility of including **e-factor** and the suggestion is considered and included. Dr. Gururaj Shivashimpi suggested to remove the Strecker's synthesis, as it involves the use of cyanides, The suggestion is considered and removed.
- In Unit-II Dr. Mahesh B suggested to include details of order of reaction, but it will be covered in all the reactions mentioned in this unit so no need to elaborate it. Dr. Dharma Prakash accepted this decision.
- In Unit-III Dr. Gururaj Suggested to include introduction to antibiotics and the suggestion is considered and included.
- In Unit-IV, Dr. Dharmaprakash to include all types of distillation techniques and the suggestion is considered.
- In Unit-V, Dr. Gururaj suggested to include fluorescence dyes, but because of time constraints it is not included how ever it can be given as experiential learning topic.
- All course out comes accepted without any modification.

Agenda #	Discussions and Resolutions
14	Discussion and finalization of laboratory experiments

- Dr. Gururaj, suggested to include at least one palladium catalyzed experiment, but because of hazardous nature and safety constraints it is considered.
- All other experiments are accepted by the BoS members.
- BoS members suggested to prepare the laboratory manual.

➢ Discussion on the Following actions taken by the department based on the feedback received from the students (2020-21) were carried out and BoS members found the implementation satisfactory.

1. New syllabus was framed and implemented
2. Lab manuals were redesigned to reduce routine work for students and to concentrate more on experiments.
3. More weightage was given to inference and societal learning keeping the practical aspects learning.
4. Faculty were trained to take effective online/ offline class in a hybrid mode.
5. Faculty were advised to record their class session and provide it to students.
6. Usage of LMS was encouraged.

Concluding remarks by External BoS members,

- Prof. D Krishna Bhat, Fair enough to give basic chemistry knowledge to chemical engineering students
- Prof. Mahesh B, over all it is a good syllabus.
- Prof. Dharma Prakash, Good syllabus covering the safety and chemical hazardous
- Dr. Gururaj Shivashimpi, many green chemistry concepts are covered. Really good syllabus which is required for chemical engineering students.
- All the external members appreciated both modules of syllabus.

Dr. Raviraj Kusanur, thanked all the members and concluded the meeting.

Head, Dept. of Chemistry
RV College of Engineering
Bengaluru - 560 059

The following actions were taken as per the suggestion of BoS members

Agenda #	Discussions and Resolutions
13	To record and finalize Technical Chemistry Syllabus (Theory)

- E- factor is included as suggested by Dr. Krishna Bhat
- Strecker's synthesis is removed as suggested by Dr. Gururaj Shivashimpi
- In Unit-II Dr. Mahesh B suggested to include details of order of reaction, but it will be covered in all the reactions mentioned in this unit so no need to elaborate it.
- In Unit-III Dr. Gururaj Suggested to include introduction to antibiotics and the suggestion is considered and included.
- In Unit-IV, Dr. Dharmaprakash to include all types of distillation techniques and the suggestion is considered.
- In Unit-V, Dr. Gururaj suggested to include fluorescence dyes, but because of time constraints it is not included how ever it can be given as experiential learning topic.

Agenda #	Discussions and Resolutions
14	Discussion and finalization of laboratory experiments

- Dr. Gururaj, suggested to include at least one palladium catalyzed experiment, but because of hazardous nature and safety constraints it is considered.
- As suggested by BoS members, Lab manual will be prepared.

Chairman
BoS in Chemistry
R V. College of Engineering
Mysore Road, Bengaluru-59.

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DEPARTMENT OF CHEMISTRY

Date: 24.11.2022

To,
Principal
RVCE, Bengaluru

Sub- Requesting permission to conduct BOS meeting on Monday 28.11.2022

Sir,

We are conducting the **Board of studies meeting on Tuesday 29.11.2022, at 10.30 AM** to discuss on **revision of Applied chemistry syllabus** for I year BE students. I kindly request you to give the permission for the same.

Thanking you,

24.11.22
HOD Chemistry
Head, Dept. of Chemistry
RV College of Engineering
Bengaluru - 560 059

Permitted
24/11/22

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RV College of Engineering

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DEPARTMENT OF CHEMISTRY

Ref: RVCE/CHEM/BOS/2022-23 **Date: 24.11.2022**

MEETING NOTICE

Dear Sir/Madam,

I am pleased to invite you for the meeting of members of Board of Studies (BOS) on Tuesday, **29th November 2022 at 10.30 AM**. The agenda of meeting is as follows.

15. To discuss and finalise Applied Chemistry syllabus (Engineering & Environmental Chemistry) for I year BE students of Civil Engineering stream.

16. To discuss and finalise Applied Chemistry syllabus (Chemistry of Engineering Materials) for I year BE students of Mechanical Engineering stream.

17. To discuss and finalise Applied Chemistry syllabus (Chemistry of Functional Materials) for I year BE students of Electronics and communication Engineering stream.

18. To discuss and finalise Applied Chemistry syllabus (Chemistry of Smart Materials & Devices) for I year BE students of Computer Science and Engineering stream.

19. To discuss and finalise the syllabus of Elective course of Emerging Technology course-Fundamentals of Nanoscience and Technology for I year BE students.

20. To take the permission to incorporate one question from the laboratory experiments in SEE theory exam question paper.

Kindly request you to be a part of this meeting as your inputs are valuable to us.

Thanking you,

Yours faithfully, 24/11/24

Dr. Raviraj Kusanur

Chairman, BOS Chemistry

Chairman
BoS in Chemistry
R.V. College of Engineering
Mysore Road, Bengaluru-59

Copy to,

1. **Prof. Sandeep Kumar**, RRI Bangalore
2. **Prof. S K Nataraj,** CNMS, Jain University, Bangalore
3. **Dr. G V Shanbhag,** Material Science Division, PPISR, Bangalore
4. **Dr.Gururaj Shivashimpi,** CEO and Head of Chemistry Operations, SudhiShubha ChemSynthons

DEPARTMENT OF CHEMISTRY

Minutes of BOS meeting held on 29th, November 2022

Agenda	To finalize the applied chemistry syllabus for 2022 scheme
Date	29.11.2022
Time	10.30 am
Venue	Department of Chemistry, RV College of Engineering, Bangalore

External Members Present				
#	Name of the member	Designation	Department	Signature
1	Dr. Sandeep Kumar	Professor	Raman Research Institute, Bangalore	
2	Dr. Gururaj Shivashimpi	CEO and head of Chemistry	Sudhi Shubha chem synthons LLP, Bangalore	
3	Dr. S K Nataraj	Professor and Group Leader	Dept of Chemistry BMSCE, Bangalore	
4	Dr. G V Shanbhag	Assoc Prof and Head	Material Science Division PPISR Bangalore	
Internal Members Present				
1	Dr. Raviraj Kusanur	Assoc Prof & Chairman BoS	Dept of Chemistry, RVCE, Bangalore	
2	Dr. Natarajan K	Professor	Dept of Chemistry, RVCE, Bangalore	
3	Dr. Mahesh R	Asst Prof	Dept of Chemistry, RVCE, Bangalore	
4	Dr. Manjunatha C	Asst Prof	Dept of Chemistry, RVCE, Bangalore	
5	Dr. Divakara S G	Asst Prof	Dept of Chemistry, RVCE, Bangalore	
6	Dr. Sham Aan M P	Asst Prof	Dept of Chemistry, RVCE, Bangalore	
7	Dr. Sridharan M	Asst Prof	Dept of Chemistry, RVCE, Bangalore	
8	Dr. Swarna M Patra	Asst Prof	Dept of Chemistry, RVCE, Bangalore	
9	Dr. Vishnumurthy K A	Asst Prof	Dept of Chemistry, RVCE, Bangalore	

Dr. Raviraj Kusanur, Chairman of BOS- Chemistry welcomed all the members. The meeting started with introduction of the new BoS members. BoS Chairman explained the process of curriculum revision based on NEP and VTU guidelines.

The following points were discussed:

Agenda #	Discussions and Resolutions
15	To discuss and finalise Applied Chemistry syllabus (Engineering & Environmental Chemistry) for I year BE students of Civil Engineering stream.
Unit1: Dr. S K Nataraj suggested to incorporate the topics on the emerging pollutants Dr. Gururaj suggested to incorporate the microwave methods Unit 4: Dr. S K Nataraj suggested adding surface characteristics such as surface area. Unit 5: Dr. Gururaj suggested incorporating the topics on polymers films and membranes.	

Agenda #	Discussions and Resolutions
16	To discuss and finalise Applied Chemistry syllabus (Chemistry of Engineering Materials) for I year BE students of Mechanical Engineering stream.
Unit 2: Dr. Nataraj suggested adding the topics on super battery and hybrid capacitors. Unit 3: Panel members suggested to add polymer based anticorrosion materials Unit 4: Dr. Sandeep Kumar recommended to incorporate nano additives	

Agenda #	Discussions and Resolutions
17	To discuss and finalise Applied Chemistry syllabus (Chemistry of Functional Materials) for I year BE students of Electronics and communication Engineering stream.
Unit1: Dr. Nataraj suggested the incorporation of metal air batteries. Unit 2: Panel members decided to remove topic on ALD Unit 4: Dr. Nataraj recommended adding topics on recovery of metals from e waste.	

Agenda #	Discussions and Resolutions
18	To discuss and finalize Applied Chemistry syllabus (Chemistry of Smart Materials & Devices) for I year BE students of Computer Science and Engineering stream.
Unit1: Dr, Nataraj suggested to incorporate the importance of aero gels for light weight material applications Unit 3: Dr. Sandeep Kumar suggested incorporating the importance of Liquid crystal display and the materials required for the same. Also, Dr. Gururaj suggested incorporating the ionic liquids for display technology. Unit 4: Dr. G. V. Shanbhag, suggested to keep only poly aniline as example in conducting polymers, keeping in the view of completion of syllabus. Unit-5: Dr. Gururaj and Dr. Sandeep Kumar suggested incorporating the perovskite in DSSC, also all the panel members suggested incorporating the highlights on super battery.	

Agenda #	Discussions and Resolutions
19	To discuss and finalise the syllabus of Emerging Technology Course (Fundamentals of Nanoscience and Technology) (Elective course) for I year BE students.
Unit 2: Dr. Nataraj suggested incorporating advanced synthesis method such as hydrothermal, solvo-thermal methods. Dr. Shanbhag suggested to incorporate the catalytic applications of nano materials. Unit 5: Dr. Nataraj suggested adding micronutrients importance in agriculture.	

Agenda #	Discussions and Resolutions
20	To take the permission to incorporate one question from the laboratory experiments in SEE theory exam question paper.
All the members agreed to incorporate one question from laboratory experiments in semester end exam question paper.	

- Discussion on the Following actions taken by the department based on the feedback received from the students (2021-22) were carried out and BoS members found the implementation satisfactory.
    1. Prototype / model / simulation was implemented as part of experiential learning.
    2. Topics related to industry / research oriented to be considered for next revision.
    3. Faculty groups were formed to collect feedback or input from different programs based on research collaboration / consultancy /need of chemistry in specific program wise.
    4. Faculty were encouraged to take online NPTEL courses and attend FDP to enhance their learning.

5. Faculty were advised to publish papers in Engineering application-oriented journals

Concluding remarks by External BoS members,

- Dr. Sandeep Kumar (Professor, Raman Research Institute Bangalore) appreciated the syllabus and teamwork of faculty members in framing this syllabus.
- Dr. S K Nataraj (Professor, group leader CNMC Jain university) mentioned that the syllabus is very apt for all the engineering streams.
- Dr. G V Shanbhag (Associate professor, HOD material science division Poorna prajna Research Centre) also appreciated the syllabus.
- Dr. Gururaj Shivashimpi, mentioned that many green chemistry concepts are covered. Really good syllabus which is required for engineering students
- All the external members appreciated all modules of syllabus.

Dr. Raviraj Kusanur, thanked all the members and concluded the meeting.

Chairman
BoS in Chemistry
R V. College of Engineering
Mysore Road, Bengaluru-5

Action taken report of BOS meeting held on 29th, November 2022

Agenda	To finalize the following Applied Chemistry Syllabus for 2022 scheme Engineering & Environmental Chemistry- Civil Engineering stream. Chemistry of Engineering Materials- Mechanical Engineering stream Chemistry of Functional Materials- Electronics and communication Engineering stream. Chemistry of Smart Materials & Devices- Computer Science and Engineering stream
Date	29.11.2022
Time	10.30 am
Venue	Department of Chemistry, RV College of Engineering, Bangalore

Agenda #	**Action Taken**
15	To discuss and finalise Applied Chemistry syllabus (Engineering & Environmental Chemistry) for I year BE students of Civil Engineering stream.
Unit1: Emerging pollutants **have been included** as suggested by Dr. S K Nataraj **Microwave methods included** as suggested by Dr. Gururaj Unit 4: **Surface characteristics incorporated** as suggested by Dr. S K Nataraj Unit 5: Dr. Gururaj suggested incorporating the topics on polymers films and membranes. **But because of time constraints it is not included.**	

Agenda #	**Action Taken**
16	To discuss and finalise Applied Chemistry syllabus (Chemistry of Engineering Materials) for I year BE students of Mechanical Engineering stream.
Unit 2: Hybrid **capacitors include** as per the suggestion of BoS members. Unit 3: **Added polymer** based anticorrosion materials. Unit 4: Dr. Sandeep Kumar recommended to incorporate nano additives, **but not included because of time constraint.**	

Agenda #	**Action Taken**
17	To discuss and finalise Applied Chemistry syllabus (Chemistry of Functional Materials) for I year BE students of Electronics and communication Engineering stream.
Unit1: Dr. Nataraj suggested the incorporation of metal air batteries. Metal air batteries included. Unit 2: Panel members decided to remove topic on ALD. **Included** Unit 4: Dr. Nataraj recommended adding topics on recovery of metals from e waste. **As per the suggestion recovery of metals included.**	

Agenda #	Action Taken
18	To discuss and finalize Applied Chemistry syllabus (Chemistry of Smart Materials & Devices) for I year BE students of Computer Science and Engineering stream.
Unit1: Dr, Nataraj suggested to incorporate the importance of aero gels for light weight material applications. **This topic is included**. Unit 3: Dr. Sandeep Kumar suggested incorporating the importance of Liquid crystal display and the materials required for the same. Also, Dr. Gururaj suggested incorporating the ionic liquids for display technology. **Included** Unit 4: Dr. G. V. Shanbhag, suggested to keep only poly aniline as example in conducting polymers, keeping in the view of completion of syllabus. **Included** Unit-5: Dr. Gururaj and Dr. Sandeep Kumar suggested incorporating the perovskite in DSSC, also all the panel members suggested incorporating the highlights on super battery. **Included the DSSC**	

Agenda #	Action Taken
19	To discuss and finalise the syllabus of emerging technology course (Elective course) for I year BE students.
Unit 2: Dr. Nataraj suggested incorporating advanced synthesis method such as hydrothermal, solvo-thermal methods. Dr. Shanbhag suggested to incorporate the catalytic applications of nano materials. **Included** Unit 5: Dr. Nataraj suggested adding micronutrients importance in agriculture. **Included as per the suggestion**	

Agenda #	Action Taken
20	To take the permission to incorporate one question from the laboratory experiments in SEE theory exam question paper.
All the members agreed to incorporate one question from laboratory experiments in semester end exam question paper. **As per the permission the questions from lab experiments in the SEE question paper included.**	

Chairman
BoS in Chemistry
R.V. College of Engineering
Mysore Road, Bengaluru-59

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DEPARTMENT OF CHEMISTRY

Date: 04.07.2023

To,
Principal
RVCE, Bengaluru

Sub- Requesting permission to conduct BOS meeting on Friday 07.07.2023 (Online mode)

Sir,

We are conducting the **Board of studies meeting on Friday 7th July at 2.30 PM** to discuss on **Global elective syllabus** offered to for V Semester BE students. I kindly request you to give the permission for the same.

Thanking you,

HOD Chemistry
Head, Dept. of Chemistry
RV College of Engineering
Bengaluru - 560 059

Permitted
4/7

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DEPARTMENT OF CHEMISTRY

Ref: RVCE/CHEM/BOS/2023-24 **Date: 04.07.2023**

MEETING NOTICE

Dear Sir/Madam,

I am pleased to invite you for the meeting of members of Board of Studies (BOS) on Friday, **7th July 2023 at 2.30 AM**. The agenda of meeting is as follows.

21. To discuss and finalise the syllabus of global elective course, Advances in corrosion science and technology (Offered to V Sem students)
22. To discuss and finalise the syllabus of global elective course, Advanced energy storage devices for e-mobility (Offered to VI Sem students)

Kindly request you to be a part of this meeting as your inputs are valuable to us.

Thanking you,

04/07/23

Yours faithfully,
Dr. Raviraj Kusanur
Chairman, BOS Chemistry

Chairman
BoS in Chemistry
R.V. College of Engineering
Mysore Road, Bengaluru-59

Copy to,

1. **Prof. Sandeep Kumar**, RRI Bangalore
2. **Prof. S K Nataraj,** CNMS, Jain University, Bangalore
3. **Dr. G V Shanbhag,** Material Science Division, PPISR, Bangalore
4. **Dr.Gururaj Shivashimpi,** CEO and Head of Chemistry Operations, SudhiShubha ChemSynthons

DEPARTMENT OF CHEMISTRY

Minutes of BOS meeting held on 7th, July 2023

Agenda	To finalize the V and VI semester global elective courses of 2021 scheme
Date	07.07.2023
Time	02.30 pm
Venue	Online: https://rvce.webex.com/rvce/j.php?MTID=m3b4933afd1dd0445944cd0288ba73883

External Members Present				
#	**Name of the member**	**Designation**	**Department**	**Signature**
1	Dr. Sandeep Kumar	Professor	Raman Research Institute, Bangalore	Attended Online
2	Dr. Gururaj Shivashimpi	CEO and head of Chemistry	Sudhi Shubha chem synthons LLP, Bangalore	Attended Online
3	Dr. S K Nataraj	Professor and Group Leader	Dept of Chemistry BMSCE, Bangalore	Attended Online
4	Dr. G V Shanbhag	Assoc Prof and Head	Material Science Division PPISR Bangalore	Attended Online
Internal Members Present				
1	Dr. Raviraj Kusanur	Assoc Prof & Chairman BoS	Dept of Chemistry, RVCE, Bangalore	07/07/23
2	Dr. Mahesh R	Asst Prof	Dept of Chemistry, RVCE, Bangalore	
3	Dr. Manjunatha C	Asst Prof	Dept of Chemistry, RVCE, Bangalore	
4	Dr. Sham Aan M P	Asst Prof	Dept of Chemistry, RVCE, Bangalore	
5	Dr. Sridharan M	Asst Prof	Dept of Chemistry, RVCE, Bangalore	
6	Dr. Swarna M Patra	Asst Prof	Dept of Chemistry, RVCE, Bangalore	Attended online
7	Dr. Vishnumurthy K A	Asst Prof	Dept of Chemistry, RVCE, Bangalore	

Dr. Raviraj Kusanur, Chairman of BOS- Chemistry welcomed all the members. The meeting started with the introduction of the new BoS members. Chairman BoS explained the process of curriculum revision based on NEP and VTU guidelines.

The following points were discussed:

Agenda #	Discussions and Resolutions
21	To discuss and finalise the syllabus of global elective course, Advances in corrosion science and technology (Offered to V Sem students)
Unit 2: Dr. S K Nataraj suggested to incorporate the topics marine corrosion in shipping industry. Dr. Shanbaug suggested to incorporate topics on use of different alloys in mechanical industry with specific example. Unit 3: Dr. S K Nataraj suggested inclusion of nanomaterials for coating applications. Unit 4: Dr. S K Nataraj suggested to incorporate a subtopic related advanced coating techniques.	

Agenda #	Discussions and Resolutions
22	To discuss and finalize the syllabus of global elective course, Advanced energy storage devices for e-mobility (Offered to VI Sem students)
Unit 2: Dr. Nataraj suggested adding the topics on metal air batteries. Unit 3: Dr. Sandeep Kumar suggested to incorporate the advanced Iron air battery and along with solid state battery. Unit 4: Panel members recommended to incorporate super batteries.	

Concluding remarks by External BoS members,

- Dr. Sandeep Kumar (Professor, Raman Research Institute Bangalore) appreciated the syllabus and teamwork of faculty members in framing this syllabus.
- Dr. S K Nataraj (Professor, group leader CNMS Jain university) mentioned that the syllabus is very apt for all the engineering streams.
- Dr. G V Shanbhag (Associate professor, HOD material science division Poorna Prajna Research Centre) also appreciated the syllabus.
- All the external members appreciated all modules of syllabus.

Dr. Raviraj Kusanur, thanked all the members and concluded the meeting.

RKasanur 07/07/23
Chairman
BoS in Chemistry
R V. College of Engineering
Mysore Road, Bengaluru-59

Action taken report of BOS meeting held on 7th, July 2023

Agenda	To finalize the V and VI semester global elective courses of 2021 scheme
Date	07.07.2023
Time	02.30 pm
Venue	Online: https://rvce.webex.com/rvce/j.php?MTID=m3b4933afd1dd0445944cd0288ba73883

Agenda #	Action Taken
21	To discuss and finalise the syllabus of global elective course, Advances in corrosion science and technology (Offered to V Sem students)
Unit 2: (i) Marine corrosion in shipping industry have been included as suggested by Dr. S K Nataraj. (ii) Different alloys in mechanical industry with specific example have been included as suggested by Dr. Shanbaug. **Unit 3:** Nanomaterials for coating applications have been incorporated as suggested by Dr. S K Nataraj. **Unit 4:** Advanced coating techniques have been included as suggested by Dr. S K Nataraj.	

Agenda #	Action Taken
22	To discuss and finalise the syllabus of global elective course, Advanced energy storage devices for e-mobility (Offered to VI Sem students)
Unit 2: Metal air batteries have been included as suggested by Dr. Nataraj. **Unit 3:** Advanced Iron air battery and along with solid state battery have been incorporated as suggested by Dr. Sandeep Kumar. **Unit 4**: super batteries have been included as per suggestion of BoS members	

07/07/23
Chairman
BoS in Chemistry
R V. College of Engineering
Mysore Road, Bengaluru-59

R.V. COLLEGE OF ENGINEERING

(An Autonomous Institution under VTU, Belgaum)

DEPARTMENT OF MATHEMATICS

RVE/MATHS-BOS/03/2017-18 **Meeting # 3** 22/01/2018

PROCEEDINGS OF THE BOARD OF STUDIES MEETING OF MATHEMATICS BOARD HELD ON 22/01/2018 AT 10.00 A.M. IN MATHEMATICS DEPARTMENT.

Members on Board:

Sl .No	Category	Sl .No.	Name of the person
1.	Head of the Department/ Faculty	1	Dr. N. Shivakumar, Prof. & Head, Dept. of Mathematics
2.	Faculty Members at different levels covering different specializations –Nominated by Academic Council (5)	1	Dr. K. Sridevi, Professor, Dept. of Mathematics
		2	Dr. G. Jayalatha Associate Professor, Dept. of Mathematics
		3	Dr. Neeti Ghiya Associate Professor, Dept. of Mathematics
		4	Dr. C. Nandeesh Kumar Asst. Professor, Dept. Of Mathematics
		5	Prof. Prakash R. Asst. Professor, Dept. Of Mathematics
3.	Subject Experts from outside the college nominated by Academic Council (2)	1.	
		2	Dr. S. M. Hegde Professor, Department of Mathematical & Computational Sciences National Institute of Technology Karnataka, Surathkal, Mangalore
4.	Expert from outside college - VTU nominee (1)	1.	Dr. G. D. Veerappa Gowda, Professor, Tata Institute of Fundamental Research Centre for Applicable Mathematics Bengaluru.
5.	Representative from industry/Corporate sector/allied area relating to placement nominated by Academic Council. (1)	1.	Dr. Vasant Jain, Leader, High performance computing GE India Technology Center, White field, Bengaluru.
6.	Postgraduate Meritorious alumnus nominated by Principal. (1)	1.	Dr. R. Mukund, Senior Principal Scientist Experimental Aerodynamics Division, NAL, NWTC. Bangalore

			Bangalore

Members Present:

1. Dr. N. Shivakumar, Professor and HOD, Mathematics Department.
2. Dr. K. Sridevi, Associate Professor, Mathematics Department.
3. Dr. G. Jayalatha, Associate Professor, Mathematics Department.
4. Dr. Neeti Ghiya, Associate Professor, Mathematics Department.
5. Dr. C. Nandeesh Kumar, Asst. Professor, Mathematics Department.
6. Prof. R. Prakash, Asst. Professor, Mathematics Department.

External Members Present:

1. Dr. B.V. Rajaram Bhat, Professor & Head, Stat-Math Unit, Indian Statistical Institute, Bengaluru.
2. Dr. S. M. Hegde, Professor, Department of Mathematical & Computational Sciences, National Institute of Technology Karnataka, Surathkal, Mangaluru.
3. Dr. G. D. Veerappa Gowda, Professor, Tata Institute of Fundamental Research Centre for Applicable Mathematics, Bengaluru.

Proceedings:

1. The HoD warmly welcomed all the members.
2. Dr. K Sridevi took over to present the syllabi framed in the 16 scheme, stressing on the fact of cluster-wise syllabus framed.
3. The minutes of the previous BoS meeting held were read out to recall the points which were discussed.
4. Dr. K. Sridevi highlighted the success of introducing MATLAB as experiential leaning in the 2016 scheme of syllabus. All the external members appreciated and encouraged to do better.
5. Dr. K. Sridevi gave information to the members about quick learn mobile app for lecture notes and online quiz.
6. An overview of syllabus of first two semesters was given as a preamble to higher semester syllabi.
7. Need based syllabi was framed in accordance with the guidelines of AICTE and VTU.
8. The clusters made for the programs for framing the syllabus are:
   i) ECE, TC, EI, EEE — 18MA31B - Discrete and Integral transform, 18MA41B - Linear Algebra, Statistics and Probability Theory
   ii) CSE, ISE — 18MA31A- Linear Algebra Laplace Transform and Combinatorics, 18MA41A- Graph Theory, Statistics and Probability Theory
   iii) ME, AS, CH, CIVIL, IEM, BT — 18MA31C/18MA41C - Engineering Mathematics - III/IV

9. Dr. S. M. Hegde suggested that the different department faculty can also take part in tutorial classes so that engineering applications of the mathematical concepts can be highlighted. Some good reference books were suggested by him for Graph Theory. He also suggested proofs of some important theorems can be included in the graph theory syllabus.
10. Dr. B. V. Rajaram Bhat suggested concepts of combinatorics can be included in the Graph theory syllabus.
11. Dr. Veerappa Gowda elaborated as how the syllabus for the global elective can be framed in partial differential equations to make it more meaningful.
12. Prof. Srinath, Dean Academics, gave information on the new credit system which is going to be introduced by AICTE from next academic year.
13. Prof. K. N. Subramanya, Principal, RVCE, highlighted about ICT and branch wise applications. Also requested members to mentor faculty members for strengthening their academics.
14. Dr. S. M. Hegde sought clarification about self study monitoring and assessment.
15. Members also suggested to have an elective in Mathematical modeling as per the global scenario.
16. Overall, members appreciated the efforts taken to frame need based syllabi for UG and PG programs.
17. The mathematics syllabi of M.Tech programs in the autonomous scheme were also presented and requested them to give valuable suggestions for future revision.
18. After the discussion of the syllabus, some general discussions as regards subject happened and meeting ended by thanking all the members.

Shivakumar. N.

Dr. N. Shivakumar
Chairman BOS (Maths)
HOD - Mathematics

Dr. N. SHIVAKUMAR
Prof and Head
Department of Mathematics
R.V. College of Engineering
BANGALORE-560 059

DEPARTMENT OF MATHEMATICS

BoS MEETING HELD ON 22-01-2018

Signature of members present:

Sl .No.	Internal Members	Signature
1.	Dr. N. Shivakumar, Professor and HOD, Mathematics Department.	
2.	Dr. K. Sridevi, Associate Professor, Mathematics Department.	22-01-18
3.	Dr. G. Jayalatha, Associate Professor, Mathematics Department.	22/1/18
4.	Dr. Neeti Ghiya, Associate Professor, Mathematics Department.	22/1/18
5.	Dr. C. Nandeesh Kumar, Asst. Professor, Mathematics Department.	
6.	Prof. R. Prakash, Asst. Professor, Mathematics Department.	

Sl .No.	External Members	Signature
1.	Dr.B.V. Rajaram Bhat, Professor & Head, Stat-Math Unit, Indian Statistical Institute, Bengaluru.	
2.	Dr. S. M. Hegde, Professor, Department of Mathematical & Computational Sciences, National Institute of Technology Karnataka, Surathkal, Mangaluru.	22/1/18
3.	Dr. G. D. Veerappa Gowda, Professor, Tata Institute of Fundamental Research Centre for Applicable Mathematics, Bengaluru.	

Received a copy.

I/c K. Sridevi
(Dr. K. SRIDEVI)
07-02-2018.

Shivakumar. N
22.1.18

Dr. N. Shivakumar
Chairman BOS (Maths)
HOD - Mathematics

DEPARTMENT OF MATHEMATICS RVCE BANGALORE

R.V. COLLEGE OF ENGINEERING

(An Autonomous Institution under VTU, Belgaum)

DEPARTMENT OF MATHEMATICS

RVE/MATHS-BOS/04/2017-18 **Meeting # 4** 27/06/2018

PROCEEDINGS OF THE BOARD OF STUDIES MEETING OF MATHEMATICS BOARD HELD ON 27/06/2018 AT 10.00 A.M. IN MATHEMATICS DEPARTMENT.

Members on Board:

Sl .No	Category	Sl .No.	Name of the person
1.	Head of the Department/ Faculty	1	Dr. N. Shivakumar Prof. & Head, Dept. of Mathematics
2.	Faculty Members at different levels covering different specializations – Nominated by Academic Council (5)	1	Dr. G. Jayalatha Associate Professor ,Dept. of Mathematics
		2	Dr. Neeti Ghiya Associate Professor ,Dept. of Mathematics
		3	Dr. C. Nandeesh Kumar Asst. Professor, Dept. Of Mathematics
		4	Prof. Prakash R. Asst. Professor, Dept. Of Mathematics
3.	Subject Experts from outside the college nominated by Academic Council (2)	1	Dr. B.V. Rajaram Bhat, Professor & Head, Stat-Math Unit, Indian Statistical Institute, Bengaluru.
4.	Expert from outside college - VTU nominee (1)	1	Dr. G. D. Veerappa Gowda, Professor, Tata Institute of Fundamental Research Centre for Applicable Mathematics Bengaluru.
5.	Representative from industry/Corporate sector/allied area relating to placement nominated by Academic Council. (1)	1	Dr. Vasant Jain, Leader, High performance computing GE India Technology Center, White field, Bengaluru.

Members Present:

1. Dr. N. Shivakumar, Professor and HOD, Department of Mathematics.
2. Dr. G. Jayalatha, Associate Professor, Department of Mathematics.
3. Dr. Neeti Ghiya, Associate Professor, Department of Mathematics.
4. Dr. C. Nandeesh Kumar, Asst. Professor Department of Mathematics.
5. Prof. R. Prakash, Asst. Professor, Department of Mathematics.

External Members Present:

1. Dr. B.V. Rajaram Bhat, Professor & Head, Stat-Math Unit, Indian Statistical Institute, Bengaluru.
2. Dr. Vasant Jain, Leader, High performance computing, GE India Technology Center, White field, Bengaluru.
3. Dr. G. D. Veerappa Gowda, Professor, Tata Institute of Fundamental Research Centre for Applicable Mathematics, Bengaluru.

Proceedings:

1. The HoD warmly welcomed all the members.
2. The minutes of the previous BoS meeting were read out to recall the points which were discussed earlier.
3. The discussion started with guidelines and the model syllabus of the under graduate engineering courses given by AICTE and VTU to frame first year syllabus for 2018 batch.
4. Syllabi for First semester, Second semester, Global electives offered for Fifth, Sixth and Seventh semester of Undergraduate courses and first semester MCA course were discussed.
5. Need based syllabi was framed in accordance with the guidelines of AICTE and VTU.
6. In the syllabus of Fifth semester Global elective, Unit V was renamed as Computational Techniques and the members felt that the students have to be given freedom to use any software for computation.
7. The members suggested to include Elementary Linear Algebra as one of the units in the second semester, and Partial differential equations in the higher semester.
8. Dr. B. V. Rajaram Bhat suggested concepts of Combinatorics to be included in the MCA syllabus.
9. Dr. Veerappa Gowda elaborated as how the syllabus for the global elective can be framed in partial differential equations to make it more meaningful.

10. Dr. Vasant Jain sought clarification about self study monitoring and assessment. Also he gave lot of inputs to strengthen the syllabus to meet the expectations of the industry from the academic institutions.
11. Overall, the members appreciated the efforts taken to frame need based syllabi for the Mathematics courses.
12. After the discussion of the syllabus, the meeting ended with vote of thanks.

Shivakumar. N

Dr. N. Shivakumar
Chairman BOS (Maths)
HOD - Mathematics

Dr. N. SHIVAKUMAR
Prof and Head
Department of Mathematics
R.V. College of Engineering
BANGALORE-560 059

Signature of members present:

Sl .No.	Internal Members	Signature
1.	Dr. N. Shivakumar, Professor and HOD, Mathematics Departmen	
2.	Dr. G. Jayalatha, Associate Professor, Mathematics Department.	
3.	Dr. Neeti Ghiya, Associate Professor, Mathematics Department.	
4.	Dr. C. Nandeesh Kumar, Asst. Professor, Mathematics Departmer	
5.	Prof. R. Prakash, Asst. Professor, Mathematics Department.	

Sl .No.	External Members	Signature
1.	Dr. B. V. Rajaram Bhat, Professor & Head, Stat-Math Unit, Indian Statistical Institute, Bengaluru.	
2.	Dr. Vasant Jain, Leader, High performance computing GE India Technology Center, White field, Bengaluru	
3.	Dr. G. D. Veerappa Gowda, Professor, Tata Institute of Fundamental Research Centre for Applicable Mathematics, Bengaluru.	

Dr. N. Shivakumar
Chairman BOS (Maths)
HOD - Mathematics

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RVE/Maths/BoS/05/2019-2020

Meeting #5

Board of Studies meeting

Minutes of meeting held on Monday, 13th May 2019

Agenda	BoS meeting for the proposed 2018 scheme syllabi of Mathematics course for III and IV semesters
Date	Monday, 13th May 2019
Time	10.30am
Venue	Chemical Seminar Hall, RVCE

Members on Board:

Sl. No	Category	Sl. No	Name of the person
1.	Chairman	1	Dr. K. Sridevi Prof. & Head, Dept. of Mathematics
2.	Faculty Members at different levels covering different specializations – Nominated by Academic Council (5)	1	Dr. N. Shivakumar Prof., Dept. of Mathematics
		2	Dr. G. Jayalatha Associate Professor, Dept. of Mathematics
		3	Dr. Neeti Ghiya Associate Professor, Dept. of Mathematics
		4	Dr. C. Nandeesh Kumar Asst. Professor, Dept. Of Mathematics
		5	Prof. Prakash R. Asst. Professor, Dept. Of Mathematics
		6	Prof. T. Kavitha Asst. Professor, Dept. Of Mathematics
3.	Subject Experts from outside the college nominated by Academic Council (2)	1	Dr. M.K. Partha, Professor and Head Department of Mathematics, M.C.E.,Hassan
		2	Dr. S. M. Hegde, Professor, Department of Mathematical & Computational Sciences, National Institute of Technology Karnataka, Surathkal, Mangaluru.
4.	Expert from outside college - VTU nominee (1)		Yet to be nominated by VTU
5.	Representative from industry/ Corporate sector/ allied area relating to placement nominated by Academic Council. (1)	1	Dr. Vasant Jain, Leader, High performance computing GE India Technology Center, White field, Bengaluru.
6	Meritorious Alumnus Nominated by Principal		Sanjay Venugopal Manager – APC Soluations, Yokogawa IA Technologies India Ltd., Bangalore

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Members Present:

	Internal members present		
	Name of the faculty	**Designation**	**Dept.**
1.	Dr. K. Sridevi	Chairman, Professor and HOD	Mathematics
2.	Dr. N. Shivakumar	Professor	Mathematics
3.	Dr. G. Jayalatha	Associate Professor	Mathematics
4.	Dr. Neeti Ghiya	Associate Professor	Mathematics
5.	Dr. C. Nandeesh Kumar	Associate Professor	Mathematics
6.	Prof. R. Prakash	Asst. Professor	Mathematics
7.	Prof. T. Kavitha	Asst. Professor	Mathematics
Invited internal member			
8.	Dr. Savithri Shashidhar	Asst. Professor	Mathematics
External members nominated by Academic Council			
9.	Dr. M.K. Partha	Professor and Head	Mathematics, M.C.E.,Hassan
Industry representative nominated by Principal			
10.	Dr. Vasant Jain	Leader, High performance computing	GE India Technology Center, White field, Bengaluru.

Enclosed: 1. Meeting minutes
2. Signature list of members present

K. Sridevi
(K.Sridevi)

Dr. K. SRIDEVI M.Sc., Ph.D.
Professor and Head
Department of Mathematics
R.V. College of Engineering
BANGALORE - 560 059

DEPARTMENT OF MATHEMATICS

BoS MEETING HELD ON 13-05-2019

Signature of members present:

Sl .No.	Internal Members	Signature
1.	Dr. K. Sridevi, Professor and HOD	K. Sridevi
2.	Dr. N. Shivakumar, Professor	Shivakumar. N
3.	Dr. G. Jayalatha, Associate Professor	Jayalatha. G
4.	Dr. Neeti Ghiya, Associate Professor	Neeti
5.	Dr. C. Nandeesh Kumar, Associate Professor	
6.	Dr. R. Prakash, Assistant Professor	
7.	Prof. T. Kavitha, Assistant Professor	

Sl .No.	Invited Internal Members	
1.	Dr. Savithri Shashidhar, Associate Professor	

Sl .No.	External Members nominated by Academic Council	Signature
1.	Dr. M.K. Partha, Professor and Head Department of Mathematics, M.C.E.,Hassan.	M.K. Partha

Sl. No.	Industry representative nominated by Principal	
1.	Dr. Vasant Jain, Chief Engineer Myelin Foundry, Bangalore.	

K. Sridevi

Dr. K. Sridevi
Chairman BOS (Maths)
HOD - Mathematics

Dr. K. SRIDEVI M.Sc., Ph.D.
Professor and Head
Department of Mathematics
R.V. College of Engineering
BANGALORE - 560 059

Dr. K. Sridevi, Chairman of the Mathematics Board welcomed all members of the Board of Studies and briefed about the meeting agenda.
The following points were discussed:

Agenda #	Discussions and Resolutions
5.1	Welcome members of new board, read and record the minutes of previous meetings;

- The BoS meeting started at 10.30 am in the seminar hall of Chemical department. Two external members and eight internal members were present.
- Dr. K. Sridevi welcomed all the members and introduced external members Dr. M.K. Partha and Dr. Vasant Jain.
- Minutes of previous meeting were briefed.
- Dr. KSR highlighted some of the recent achievements of the college and briefed the UG/PG courses offered by DoM.
- Dr. K.N. Subramanya, Principal joined the meeting and gave awareness about incubation center to encourage and nurture start-ups, design thinking Lab for students to work on their innovative ideas etc, to external members and he requested them to give their valuable suggestions for fulfilling the academic requirements.

Agenda #	Discussions and Resolutions
5.2	Highlights of implementation of 2016 scheme syllabi

- Dr. KSR continued the presentation by recalling implementation of 2016 cluster wise syllabus and the reason for revision.
- She mentioned about the series of meetings conducted at the college level in connection with syllabus revision for the academic year 2018.

Agenda #	Discussions and Resolutions
5.3	Discussion of Proposed III and IV semester syllabus for CS and IS programs

- Dr. KSR presented III semester syllabus common to CS and IS programs.
- Dr. C. Nandeesh Kumar elaborated the syllabus.
- Dr. Vasant Jain suggested change in the title as "Linear Algebra, Laplace Transform and Combinatorics" instead of "Linear Algebra, Laplace Transform and Number theory" and also suggested to include "Introduction to Combinatorial mathematics" by C. L. Liu as reference book. They agreed upon contents of first three units.
- Dr. Prakash R. elaborated on the relevance of units IV and V, recalled points discussed in earlier BOS to include these topics in next revision.
- Dr. M. K. Partha recommended changing the title of Unit V as Fundamentals of Number theory instead of Number theory.
- IV sem syllabus titled "Graph Theory, Statistics and Probability theory" was briefed by Dr. KSR.
- External members suggested to shift the applications mentioned in Unit I to Unit II and add multiple regression to Unit IV and change linear, parabolic curve fitting to polynomial curve fitting. In Unit V distributions should be mentioned in the order as binomial, Poisson, exponential, normal and Weibull.

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Agenda #	Discussions and Resolutions
5.4	Discussion of Proposed III and IV semester syllabus for EC,EE,EI and TE programs

- Chairman presented III and IV semester syllabi common to EC, EE, EI and TE programs.
- It was mentioned that major changes are not made from 2016 scheme as the syllabi are appropriate to these programs.
- External members suggested not mentioning standard deviation in unit IV as it is obvious from variance and also removing mean from Joint probability distribution function.

Agenda #	Discussions and Resolutions
5.5	Discussion of Proposed III and IV semester syllabus for AS, BT, CH, CV, IM and ME programs

- Dr.KSR presented III sem syllabus common to AS, BT, CH, CV, IEM, ME and IV sem syllabus common to AS, CH, CV, ME.
- Prof. T. Kavitha elaborated Unit IV.
- External members suggested adding NPTEL video link as reference for sparse linear system in Unit IV of III sem syllabus.
- They also suggested mentioning finite Markov chain in unit V of IV semester syllabus.

Agenda #	Discussions and Resolutions
5.6	Other points discussed

- The syllabi of 2018 scheme Bridge course for lateral entry students and 2016 scheme M.Tech global elective were also presented.
- The members were briefed about course outcomes and its mapping, preparation of question papers based on weightage for COs and following BTL scheme.
- She also mentioned about encouraging students in taking up NPTEL online courses.
- External members were requested to suggest global electives for 2018 scheme.
- Members suggested to offer courses on Nonlinear Optimization, Data Science or basics of AI and Machine Learning.
- Dr. M. K. Partha appreciated cluster wise syllabus and suggested to add more application problems in teaching and evaluation.
- Dr. Vasant Jain suggested to take feed back from students about the course and to add a question "Will you recommend this course to your friends".
- Dr. K. Sridevi, HoD, sought the permission to make any suitable changes in the proposed syllabus which would be informed to members also.
- She concluded the presentation after thanking members for their valuable suggestions.

Meeting concluded with thanks to the chair

****

K. Sridevi

Dr. K. SRIDEVI M.Sc., Ph.D.
Professor and Head
Department of Mathematics
R.V. College of Engineering
BANGALORE - 560 059

DEPARTMENT OF MATHEMATICS

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RVE/Maths/117/2019-2020

Meeting #6

Board of Studies meeting

Minutes of meeting held on Friday, 6th March 2020

Agenda	BoS meeting for the proposed 2018 scheme Global Electives syllabi for V, VI and VII semesters
Date	Friday, 6th March 2020
Time	10.30am
Venue	Chemical Seminar Hall, RVCE

Members on Board:

Sl. No	Category	No	Name of the person
1.	Chairman	1	Dr. K. Sridevi Prof. & Head, Dept. of Mathematics
2.	Faculty Members at different levels covering different specializations – Nominated by Academic Council (5)	1	Dr. N. Shivakumar Prof., Dept. of Mathematics
		2	Dr. G. Jayalatha Associate Professor, Dept. of Mathematics
		3	Dr. Neeti Ghiya Associate Professor, Dept. of Mathematics
		4	Dr. C. Nandeesh Kumar Asst. Professor, Dept. Of Mathematics
		5	Dr. Prakash R. Asst. Professor, Dept. Of Mathematics
		6	Prof. P L Rajashekhar Asst. Professor, Dept. Of Mathematics
3.	Subject Experts from outside the college nominated by Academic Council (3)	1	Dr. M.K. Partha, Professor and Head Department of Mathematics, M.C.E.,Hassan
		2	Dr. S. M. Hegde, Professor, Department of Mathematical & Computational Sciences, National Institute of Technology Karnataka, Surathkal, Mangaluru.
		3	Dr. Mahesh Narayana, Senior Lecturer, Department of Mathematics, The University of the West Indies, Mona Campus, Kingston 7, JAMAICA
4.	Expert from outside college - VTU nominee (1)	1	Dr. A K Nandakumaran, Professor Department of Mathematics IISc, Bengaluru – 560012
5.	Representative from industry/Corporate sector/allied area relating to placement nominated by Academic Council. (1)	1	Dr. Vasant Jain, Chief Engineer Myelin Foundry, Bengaluru.
6	Meritorious Alumnus Nominated by Principal	1	Sanjay Venugopal Manager – APC Soluations, Yokogawa IA Technologies India Ltd., Bangalore

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06-03-2020

Members Present:

	Name of the faculty	Designation	Dept.	Signature
Internal members present				
1.	Dr. K. Sridevi	Chairman, Professor and HOD	Mathematics	
2.	Dr. N. Shivakumar	Professor	Mathematics	
3.	Dr. G. Jayalatha	Associate Professor	Mathematics	
4.	Dr. Neeti Ghiya	Associate Professor	Mathematics	
5.	Dr. C. Nandeesh Kumar	Associate Professor	Mathematics	
6.	Dr.. R. Prakash	Asst. Professor	Mathematics	
7.	Prof. P L Rajashekhar	Asst. Professor	Mathematics	
Invited internal members				
8.	Dr. Savithri Shashidhar	Associate Professor	Mathematics	
9.	Dr. Sowmya M	Asst. Professor	Mathematics	
10.	Dr. Satish V M	Asst. Professor	Mathematics	
External members nominated by Academic Council				
11.	Dr. S M Hegde	Professor	NITK, Suratkal, Mangalore	
12.	Dr. Mahesha Narayana	Senior Lecturer	The University of the West Indies,JAMAICA	
Industry representative nominated by Principal				
13.	Dr. Vasant Jain	Chief Engineer	Myelin Foundry Bengaluru.	

Enclosed: 1. Meeting minutes

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Minutes of 6th BoS meeting held on 06-03-2020

Dr. K. Sridevi, Chairman of the Mathematics Board welcomed all members of the Board of Studies and briefed about the meeting agenda.

The following points were discussed:

Agenda #	Discussions and Resolutions
6.1	Welcome some members of new board, read and record the minutes of previous meetings;

- The BoS meeting started at 10.30 am in the seminar hall of Chemical department. Three external members and eight internal members were present.
- Dr. K. Sridevi welcomed all the members and introduced external members Dr. S. M. Hegde and Dr. Vasant Jain.
- She mentioned that Dr. A. K. Nanadakumaran, Professor in department of Mathematics, IISc Bengaluru, as nominated member from VTU.
- She also introduced Mr. P. L. Rajashekara as internal member in place of Mrs. T. Kavitha who left the college on personal grounds.
- Minutes of previous meeting were briefed.
- Dr. KSR highlighted some of the recent achievements of the college, Branding of our trust RSST with the tag line Go, Change the World, getting approval for University status.
- She also briefed the UG/PG courses offered by DoM.
- Dr. Shanmukha Nagaraj, Dean Academics, joined the meeting and gave awareness to external members about design thinking Lab for students to work on their innovative ideas etc.; He requested them to give their valuable suggestions towards having separate lab sessions for mathematics courses and fulfilling the academic requirements.

Agenda #	Discussions and Resolutions
6.2	Highlights of implementation of 2016 and 2018 scheme syllabi

- The external members asked about what are the measures taken to improve academic courses and how often is the syllabus changed.
- Dr. KSR mentioned about the changes made in 2007, the year of getting autonomy and further changes in the years 2010, 2012, 2016 and 2018. Implementation of 2016 clusterwise syllabus and the reason for revision. MATLAB implementation and continuation of these measures in 2018 scheme.
- She mentioned about the series of meetings conducted at the college level in connection with global elective syllabus revision for the academic year 2018.

Agenda #	Discussions and Resolutions
6.3	Discussion of proposed V semester global elective syllabus

- Dr. KSR presented V semester global elective syllabus Computational Advanced Numerical Methods and also mentioned it's an ongoing course in 2016 scheme with student strength of 120.
- Dr. G. Jayalatha elaborated the syllabus.
- Dr. Vasant Jain suggested including sparse linear systems.
- Dr. Vasant Jain and Dr. S. M. Hegde suggested mentioning MATLAB in the title itself instead of in each unit.
- Dr. Mahesha Narayana appreciated the contents of the elective and adviced lab sessions for simulation part.
- The new elective to be proposed in 2018 scheme, Mathematics for Machine Learning was briefed by Dr. KSR.
- Dr. Vasant Jain suggested teaching concept based applications.
- Dr. KSR highlighted applications of gradient.

V semester : Computational Advanced Numerical Methods and Mathematics for machine Learning

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Agenda #	Discussions and Resolutions
6.4	Discussion of proposed VI semester global elective syllabus

- Chairman presented VI semester global elective syllabi, Advanced Statistical Methods, Non-linear optimization and Mathematical Modeling.
- Dr. Vasant Jain suggested books for the syllabi.
- Dr. Mahesha Narayana suggested including simulation in Mathematical Modeling syllabus.
- VI semester : Advanced Statistical Methods and Mathematical Modelling

Agenda #	Discussions and Resolutions
6.5	Discussion of Proposed VII semester global elective syllabus

- Chairman presented VII semester global elective syllabi, Advanced Linear Algebra, Mathematics for Finance and Graph Theory and Applications.
- Dr. KSR requested for suggestions from board members if the existing syllabus of Advanced Linear Algebra could be retained as it as.
- Dr. M. Sowmya elaborated the syllabus.
- Dr. Vasant Jain questioned about relevance of Markov chain in Unit II
- Dr. Mahesha Narayana suggested moving Applications to difference equations and Markov chains to the end of the unit.
- Dr. Satish elaborated on the syllabus of the courseGraph theory and Applications. Dr. S. M. Hegde suggested books for reference.
- Dr. Vasant Jain suggested few applications of Graph theory for Unit IV.
- Dr. Prakash elaborated on the syllabus of Mathematics for Finance.
- Dr. Vasant Jain suggested including time series analysis as prerequisite and introduction to stochastic process in Unit IV.
- Dr. Prakash mentioned that prerequisites will be mentioned.
- Dr.KSR mentioned that few hours of orientastion from IEM department faculty will be given to students.

Agenda #	Discussions and Resolutions
6.6	Other points discussed

- Dr. M K Partha, Professor and Head, Department of Mathematics, MCE, Hassan who could not make it come for the meeting has sent his inputs via email.
- He has sent some good reference books for the course Advanced Statistical Methods.
- Also for the course Mathematics for Machine Learning he has suggested inclusion of Bayesian statistical inference, classical statistical inference, covariance and correlation, eigen values-needed for PCA and some momentum based optimization algorithms.
- He has advised inclusion of Rutishauser's method for arbitrary matrices in the course Computational Advanced Numerical methods.
- The external members aprpreciated the efforts put by faculty of mathematics department in framing syllabus for industry oriented courses in mathematics.
- They also expressed that it will be a huge task to deliver the content in a good manner and offered their support in the process.
- Chairman concluded the presentation after thanking members for their valuable suggestions.

Meeting concluded with thanks to the chair

****

K. Sridevi

Dr. K. SRIDEVI M.Sc., Ph.D.
Professor and Head
Department of Mathematics
R.V. College of Engineering
BANGALORE - 560 059

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Meeting #7

RVE/Maths/21 ▽2021-2022

Board of Studies meeting

Minutes of meeting held on Wednesday, 25th August 2021(VIRTUAL)

Agenda	BoS meeting for the proposed 2021 scheme syllabi of I and II semesters
Date	Wednesday, 25th August 2021
Time	10.30am
Venue	Department of Mathematics

Members on Board:

Sl. No	Category	No	Name of the person
1.	Chairman	1	Dr. K. Sridevi Prof. & Head, Dept. of Mathematics
2.	Faculty Members at different levels covering different specializations – Nominated by Academic Council (5)	1	Dr. N. Shivakumar Prof., Dept. of Mathematics
		2	Dr. G. Jayalatha Associate Professor, Dept. of Mathematics
		3	Dr. Neeti Ghiya Associate Professor, Dept. of Mathematics
		4	Dr. C. Nandeesh Kumar Asst. Professor, Dept. Of Mathematics
		5	Dr. Prakash R. Asst. Professor, Dept. Of Mathematics
		6	Prof. P L Rajashekhar Asst. Professor, Dept. Of Mathematics
3.	Subject Experts from outside the college nominated by Academic Council (3)	1	Dr. M.K. Partha, Professor and Head Department of Mathematics, M.C.E.,Hassan
		2	Dr. S. M. Hegde, Professor, Department of Mathematical & Computational Sciences, National Institute of Technology Karnataka, Surathkal, Mangaluru.
		3	Dr. Mahesh Narayana, Senior Lecturer, Department of Mathematics, The University of the West Indies, Mona Campus, Kingston 7, JAMAICA
4.	Expert from outside college - VTU nominee (1)	1	Dr. A K Nandakumaran, Professor Department of Mathematics IISc, Bengaluru – 560012
5.	Representative from industry/Corporate sector/allied area relating to placement nominated by Academic Council. (1)	1	Dr. Vasant Jain, Chief Engineer Myelin Foundry, Bengaluru.
6	Meritorious Alumnus Nominated by Principal	1	Sanjay Venugopal Manager – APC Soluations, Yokogawa IA Technologies India Ltd., Bangalore

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7th BoS (Virtual)

25th August 2021

Dr. K. Sridevi, Chairman of the Mathematics Board welcomed all members of the Board of Studies and briefed about the meeting agenda.
The following points were discussed:

Agenda #	Discussions and Resolutions
7.1	Welcome members of the board, read and record the minutes of previous meetings;

- The BoS meeting started at 10.30 am in the chambers of HoD of Mathematics.. Principal, Dean (Academics), three external members Dr. Suresh M Hegde, Dr. M K Partha, Dr. Mahesh Narayan and alumni representation Mr. Sanjay Venugopal, seven internal BoS members were present and the remaining faculty members of the department were also asked to attend the meeting online..
- Dr. K. Sridevi welcomed all the members and introduced external members Dr. Suresh M. Hegde, Dr. M. K. Partha and Dr. Mahesha Narayana to the internal members.
- Principal addressed the online gathering about the implementation of NEP. He stressed on the components of visualisation and application based concepts adding value to the knowledge base of the students. The blended mode of conduction of classes was emphasized. The mode of evaluation for CIE was conveyed as: Test 40 marks, Quiz 20 marks and Experiential Learning (EL) 40. Principal also suggested involving the external BOS members to teach particular modules of syllabus.
- Dr. Shanmukha Nagaraj, Dean (Academics), joined the meeting and extended a warm welcome to all members, appreciated the efforts made by faculty of department in conduction of 'online classes' during the pandemic. Emphasis on self-learning was highlighted; He also requested external members to give their valuable suggestions for fulfilling the academic requirements.
- Dr. KSR continued with the meeting and the minutes of previous meeting were briefed.
- The Chairperson highlighted that RV University has been housed in RVCE campus and it has become functional with programmes starting from the academic year 2021-22. She highlighted RVCE being awarded 'Diamond' rating in QS-I Quage ranking in 2021. The department activities and starting of new BE programme 'AI & ML' were mentioned.
- She also briefed the UG/PG courses and Global Electives (GE) offered by DoM.

Agenda #	Discussions and Resolutions
7.2	Modification of 5th semester 2018 scheme global elective syllabus 'Mathematics for Machine Learning' (18G5B17).

- The external members asked about what are the measures taken to improve academic courses and how often is the syllabus changed.
- Dr. KSR recalled the discussions held in the previous meeting to implement Global Electives in 2018 scheme and mentioned how good these electives have been received by the students. About 240 students have taken two electives offered both in 5th and 6th semesters.
- She mentioned about the difficulties faced by faculty in handling these courses for the first time and also that it's good opportunity for faculty to learn new concepts of relevance in present scenario.
- She requested the BOS members for minor changes in the global elective course for 5th semester 'Mathematics for Machine Learning' as it was felt by the faculty handling the course that flow of the subject delivery has to be made better. She requested Dr. Prakash to highlight about the changes

required.

- Dr. Prakash R, Associate Professor, DoM presented the changes required in the global elective course 'Mathematics for Machine Learning' for 5th semester.
- Dr. Partha M K suggested improvements by introducing linear transformation and applications in syllabus. It was clarified that these concepts have been dealt in earlier semesters.
- Dr. Mahesha Narayana appreciated the contents of the elective and adviced lab sessions for simulation part.
- After discussion it was agreed to implement changes by the BOS members.

Agenda #	Discussions and Resolutions
7.3	Discussion of Proposed new syllabus for I semester, common to all programme as per NEP requirement

- Dr. KSR presented new syllabus for I semester, common to all programme. The title of I semester syllabus was proposed as 'Multivariable Calculus' based on contents and the flow of topics for various units was discussed.
- She also mentioned about the concept of Experiential Learning (EL) for earlier schemes and continuing to implement MATLAB as one of the EL components in the new scheme.
- She highlighted about the weightage of EL in CIE which is for 40 marks and to be split into two parts: 20 marks (MATLAB) and 20 marks (applications part), rubrics would be decided.
- Dr. Mahesha Narayana appreciated the contents of the I semester new syallabus and adviced to give small research oriented problems for the students.
- Dr. S. M. Hegde, Dr. M. K. Partha suggested to rename Unit I of the syllabus as 'Functions of several variables and Partial differentiation'.
- All the external BOS members expressed that syllabus is not huge and heavy for students, and also appreciated about the reference books.
- Dr. KSR highlighted the usefulness of the contents in each unit and connection and flow of contents among the units proposed for I semester.
- Dr. Partha M K suggested teaching of concept based applications and to include Mathematical modelling as one unit.

Agenda #	Discussions and Resolutions
7.4	Discussion of Proposed new syllabus for IInd semester, cluster-wise.

- Dr. KSR presented new syllabus for IInd semester based on the requirements of various programmes. The following clusterwise syllabi was proposed for 2021 Scheme:
  1. 18MA21A for CS, IS, AI & ML
  2. 18MA21B for EC, ET, EE, EI
  3. 18MA21C for AS, BT, CH, CV, IM, ME
- Chairperson mentioned about the division of 2nd semester syllabus: 60% of syllabus is common for all programmes for equivalence purpose and 40% changes based on requirement of specific programmes.
- Dr. Suresh M Hegde suggested interchanging of the units Numerical methods I and Numerical methods II for all cluster syllabi.
- The reference book with title 'Applied Numerical methods for Engineering' by Sandra L and Haris was

suggested by Dr. Partha M K.

- Mr. Sanjay Venugopal expressed concern that non-circuit programmes also require Laplace Transforms. It was clarified to him that the particular concept would be included in third semester for them.
- 21MA11 - Multivariable Calculus and 21MA21 - Differential Equations and Numerical Methods

Agenda #	Discussions and Resolutions
7.5	Other points discussed

- Dr. Vasant Jain, Chief Engineer, Myelin Foundry, Bengaluru who could not make it to attend the meeting due to health issues.
- Alumni (Mr. Sanjay Venugopal), has mentioned about the role of statistics in weather prediction, multi input and output process control model which can be considered for EL component. He also appreciated about the proposed new syllabus for 2021 scheme.
- The external members appreciated the efforts put by faculty of Mathematics department in framing syllabus for industry oriented courses in Mathematics.
- They also expressed that it will be a huge task to deliver the content both for UG/PG in a good manner and offered their support in the process.
- The proposed new syllabus and modification of GE was well appreciated by all members and alumni representative.
- Chairman concluded the presentation after thanking members for their valuable suggestions.

Meeting concluded with thanks to the chair.

K Sridevi

Dr. K. SRIDEVI M.Sc., Ph.D.
Professor and Head
Department of Mathematics
R.V. College of Engineering
BANGALORE - 560 059

DEPARTMENT OF MATHEMATICS

BoS MEETING HELD ON 25-08-2021

Signature of members present:

Sl. No.	Internal Members	Signature
1.	Dr. K. Sridevi, Professor and HoD	K. Sridevi
2.	Dr. N. Shivakumar, Professor	Shivakumar.N
3.	Dr. G. Jayalatha, Associate Professor	Jayalatha.G
4.	Dr. Neeti Ghiya, Associate Professor	25/8/21
5.	Dr. C. Nandeesh Kumar, Associate Professor	
6.	Dr. R. Prakash, Associate Professor	25/8/21
7.	Mr. P L Rajashekar, Assistant Professor	P.L. Raja KK

Sl. No.	External Members nominated by Academic Council	Signature
1.	Dr. M.K. Partha, Professor and Head Department of Mathematics, M.C.E., Hassan- 573201 Mob: 6360459806 Mail: mkpartha@rediffmail.com	Attended online
2.	Dr. S.M. Hegde, Professor, Dept. of Mathematical & Computational Sciences National Institute of Technology Karnataka, Surathkal, Mangalore-575025. Mob: 9449814252 Mail: smhegde@nitk.ac.in	Attended online
3.	Dr. Mahesha Narayana, Senior Lecturer, Department of Mathematics, The University of The West Indies, Mona Campus, Kingston 7, JAMAICA. Mob: 9731128069 Mail: mahesha.narayana@uwimona.edu.jm	Mahesha 25/08/2021

Sl. No.	Industry representative nominated by Principal	
1.	Dr. Vasant Jain, Chief Engineer Myelin Foundry, Bangalore.	Not attended
2.	Mr. Sanjay Venugopal, Manager-APC Solutions, Yokogawa IA Technologies India Ltd. Bangalore Mob: 9845075402 Mail: Sanjay.Venugopal@yti.yokogawa.com	Attended online

Sl. No.	Invited Internal Members	Signature
1.	Dr. Savithri Shashidhar, Associate Professor	
2.	Prof. Y Sailja, Assistant Professor	Y. Sailaja
3.	Prof. Sujatha A, Assistant Professor	
4.	Dr. Vidya Patil, Assistant Professor	
5.	Prof. Nivya Muchikel, Assistant Professor	
6.	Dr. Ravi K M, Assistant Professor	
7..	Dr. Satish V M, Assistant Professor	
8.	Dr. Sowmya M, Assistant Professor	25/08/21
9.	Dr. Harish M, Assistant Professor	
10.	Dr. Suman N P, Assistant Professor	N. P. Suman 25/08/2021
11.	Dr. Venugopal K, Assistant Professor	
12.	Dr. Dishaben Lalitya Vaidya, Assistant Professor	D. L. Vaidya

Dr. K. Sridevi
Chairman BoS (Maths)
HoD - Mathematics

Dr. K. SRIDEVI M.Sc., Ph.D.
Professor and Head
Department of Mathematics
R.V. College of Engineering
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DEPARTMENT OF MATHEMATICS

RVE/Maths/ /2021-2022 **Meeting #8**

Board of Studies meeting

Minutes of meeting held on Saturday, 09th April 2022

Agenda	BoS meeting for the proposed 2021 scheme syllabi of III and IV semesters
Date	Saturday, 09th April 2022
Time	10.00am
Venue	Department of Mathematics

Members on Board:

Sl. No	Category	No	Name of the person
1.	Chairman	1	Dr. K. Sridevi Prof. & Head, Dept. of Mathematics
		2	Dr. G. Jayalatha Associate Professor, Dept. of Mathematics
		3	Dr. Neeti Ghiya Associate Professor, Dept. of Mathematics
		4	Dr. C. Nandeesh Kumar Associate Professor, Dept. Of Mathematics
		5	Dr. Prakash R. Associate Professor, Dept. Of Mathematics
		6	Prof. P L Rajashekhar Asst. Professor, Dept. Of Mathematics
3.	Subject Experts from outside the college nominated by Academic Council (3)	1	Dr. M.K. Partha, Professor and Head Department of Mathematics, M.C.E.,Hassan
		2	Dr. S. M. Hegde, Professor, Department of Mathematical & Computational Sciences, National Institute of Technology Karnataka, Surathkal, Mangaluru.
		3	Dr. Mahesh Narayana, Senior Lecturer, Department of Mathematics, The University of the West Indies, Mona Campus, Kingston 7, JAMAICA
4.	Expert from outside college - VTU nominee (1)	1	Dr. Arulalan Rajan, PhD(IISc), Faculty, Proficience Programme, Indian Institute of Science, Bengaluru.
5.	Representative from industry/Corporate sector/allied area relating to placement nominated by Academic Council. (1)	1	Dr. Vasant Jain, Chief Engineer Myelin Foundry, Bengaluru.
6	Meritorious Alumnus Nominated by Principal	1	Sanjay Venugopal Manager – APC Soluations, Yokogawa IA Technologies India Ltd., Bangalore

DEPARTMENT OF MATHEMATICS

Dr. G. Jayalatha welcomed all members of the Board of Studies and biiefed about the meeting agenda on behalf of Dr. K. Sridevi, Chairman of the Mathematics Board.
The following points were discussed:

Agenda #	Discussions and Resolutions
8.1	Welcome members of the board, read and record the minutes of previous meetings;

- The BoS meeting started at 10.00 am in the chambers of HoD of Mathematics department. Principal, three external members, five internal members and five faculty members were present.
- Dr. G. Jayalatha welcomed all the members and introduced external members Dr. Vasanth Jain, Dr. Suresh M. Hegde and Dr. M. K. Partha.
- Minutes of previous meeting were briefed.
- Dr. GJ highlighted some of the department activities.
- She also briefed the UG/PG courses and Global Electives (GE) offered by DoM.
- Principal addressed the gathering about the implementation of NEP, introduction of new courses of IKS and Yoga Practice in first year, also ability enhancement courses for higher semesters by interating arts with science (libral arts). He insisted department to develop application-based concepts with visualization for the entire course. The blended mode of conduction for classes was emphasized. Principal also suggested involving the external BOS members to teach particular modules of syllabus.

Agenda #	Discussions and Resolutions
8.2	Discussion of Proposed new syllabus for III semester, cluster wise as per NEP requirement

- Dr. G. Jayalatha presented proposed new syllabus for III semester based on the requirements of non-circuit programmes. Course titled '**Integral Transforms and Advanced Numerical Methods (21MA31C)'** for AS, BT, CH, CV, IM and ME branches.
- She mentioned about the series of meetings conducted at the college level in connection with syllabus revision for the academic year 2021.
- She also mentioned about the concept of Experiential Learning (EL) for I year 2021 scheme and implementation of MATLAB as mathematical software was highlighted.
- She highlighted about the weightage of EL in CIE for III Semester which is for 40 marks and to be split into two parts: 20 marks MATLAB part and 20 marks (applications part), rubrics would be decided.
- Dr. Vasant Jain suggested introducing some simple circuit-based examples. Prof. SM Hegde suggested to use video clips in the classes for visulatisation of all the topics. External BoS members suggested some good books for reference.
- The reference book with title 'Applied Numerical methods for Engineering' by Sandra L and Haris, 'Numerical Methods for Engineers' by Chapra and Canale were suggested by external members.
- Dr. Prakash presented proposed new syllabus for III semester based on the requirements of CS and IS programmes. Course titled '**Linear Algebra, Integral Transforms and Number Theory (21MA31A)'**

and course titled '**Mathematical Funamentals for AI & ML (21MA31D)'**

- BoS members discussed the topics of proposed new syllabus and suggested to provide soft copies of MATLAB manual for the students.
- Dr.Vasanth Jain expressed his opinion that probability is the basic requirement for any AI and ML course, He quoted some examples for convolution which is required for image processing, signal processing, object detection, face recognition, etc. He also mentined convex optimization topics requires the knowledge of Graph Theory and applied probability. Dr.Vasanth Jain suggested some relevant books for Digital Image Processing and Convex Optimisation.
- Dr.Neeti Ghiya presented proposed new syllabus for III semester based on the requirements of circuit programmes .Course titled **'Linear Algebra, Integral Transforms and Fourier Series (21MA31B)'** for EC, EE, EI and ET branches.

Agenda #	Discussions and Resolutions
8.3	Discussion of Proposed new syllabus for IV semester common to all programmes as per NEP requirement

- Dr. C.Nandeesh Kumar presented propoed new syllabus of '**Statistics and Probability Fundamentals for Machine Learning (21MA41)**' for IV semester, common to all programmes as per requirements of various departments.
- He mentioned the BOS members about the reduction of credits from 4 to 3.
- **Dr. Vasanth Jain, Dr. S. M. Hegde and Dr. M. K. Partha suggested renaming the title of the course as 'Statistics and Probability for Machine Learning'.**
- BoS members suggested removing of the topics: Estimation, point estimation, interval estimation-confidence interval estimates of population parameters in the Sampling and Estimation unit (Unit IV).

Agenda #	Discussions and Resolutions
8.4	Other points discussed

- BoS members discussed probable Global electives for the 3rd and 4th year programmes. The external members suggested some topics like Error Analysis, Differential manifolds etc. for the Global Electives topics.
- The external members appreciated the efforts put by faculty of mathematics department in framing syllabus for branch oriented courses in mathematics.
- The proposed new syllabus was well appreciated by all the members.
- Chairman concluded the presentation after thanking members for their valuable suggestions.

Meeting concluded with thanks to the chair

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DEPARTMENT OF MATHEMATICS

BoS MEETING HELD ON 25-08-2021

Signature of members present:

Sl. No.	Internal Members	Signature
1.	Dr. K. Sridevi, Professor and HoD	K. Sridevi
2.	Dr. N. Shivakumar, Professor	Shivakumar.N
3.	Dr. G. Jayalatha, Associate Professor	Jayalatha.G
4.	Dr. Neeti Ghiya, Associate Professor	25/8/21
5.	Dr. C. Nandeesh Kumar, Associate Professor	
6.	Dr. R. Prakash, Associate Professor	25/8/21
7.	Mr. P L Rajashekar, Assistant Professor	P.L. Raja KK

Sl. No.	External Members nominated by Academic Council	Signature
1.	Dr. M.K. Partha, Professor and Head Department of Mathematics, M.C.E., Hassan- 573201 Mob: 6360459806 Mail: mkpartha@rediffmail.com	Attended online
2.	Dr. S.M. Hegde, Professor, Dept. of Mathematical & Computational Sciences National Institute of Technology Karnataka, Surathkal, Mangalore-575025. Mob: 9449814252 Mail: smhegde@nitk.ac.in	Attended online
3.	Dr. Mahesha Narayana, Senior Lecturer, Department of Mathematics, The University of The West Indies, Mona Campus, Kingston 7, JAMAICA. Mob: 9731128069 Mail: mahesha.narayana@uwimona.edu.jm	Mahesha 25/08/2021

Sl. No.	Industry representative nominated by Principal	
1.	Dr. Vasant Jain, Chief Engineer Myelin Foundry, Bangalore.	Not attended
2.	Mr. Sanjay Venugopal, Manager-APC Solutions, Yokogawa IA Technologies India Ltd. Bangalore Mob: 9845075402 Mail: Sanjay.Venugopal@yti.yokogawa.com	Attended online

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Approved by AICTE, New Delhi

DEPARTMENT OF MATHEMATICS

RVE/Maths/ /2022-2023

Meeting #9

Board of Studies meeting

Minutes of meeting held on Thursday, 01st December 2022

Agenda	BoS meeting for the proposed 2022 scheme syllabi of I and II semesters UG & PG
Date	Thursday, 01st December 2022
Time	10.00am
Venue	Department of Mathematics

Members on Board:

Sl. No	Category	No	Name of the person
1.	Chairman	1	Dr. G. Jayalatha Prof. & Head, Dept. of Mathematics
2.	Faculty Members at different levels covering different specializations Nominated by Academic Council (5)	2	Dr. Neeti Ghiya Associate Professor, Dept. of Mathematics
		3	Dr. C. Nandeesh Kumar Asst. Professor, Dept. Of Mathematics
		4	Dr. Prakash R. Asst. Professor, Dept. Of Mathematics
		5	Prof. P L Rajashekhar Asst. Professor, Dept. Of Mathematics
		6	Mrs. Sujatha A Asst. Professor, Dept. Of Mathematics
3.	Subject Experts from outside the college nominated by Academic Council (3)	1	Dr. Pradeep G Siddheshwar Senior Professor Department of Mathematics, School of Science Central campus Christ (Deemed to be University) Bengaluru.
		2	Dr. B. Sury ProfessorStat –Math Unit, Indian Statistical Institute, Bangalore
4.	Expert from outside college - VTU nominee (1)	1	Dr. Arulalan Rajan Faculty, Proficiency Programme Indian Institute of Science, Bengaluru
5.	Representative from industry/Corporate sector/allied area relating to placement nominated by Academic Council. (1)	1	Mr. C R Patil Group Head, Electro-Optics, Lasers and Electronic warfare Central Research laboratory, BEL, Bangalore, India
6	Meritorious Alumnus Nominated by Principal	1	Sanjay Venugopal Manager – APC Soluations, Yokogawa IA Technologies India Ltd., Bangalore

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01st December 2022

Dr. G Jayalatha, Chairperson of the Mathematics Board welcomed all members of the Board of Studies and briefed about the meeting agenda. MEETING #9

The following points were discussed:

Agenda #	Discussions and Resolutions
9.1	Welcome members of the board, read and record the minutes of previous meeting;

- The BoS meeting started at 10.30 am in the chamber of HoD of Mathematics. Principal, Dean (Academics), three external members Dr. P G Sideshwar, Dr. Arulalan Rajan, and alumni representation Mr. Sanjay Venugopal, seven internal BoS members were present and the remaining faculty members of the department were also asked to attend the meeting.
- Dr. GJ welcomed all the members and introduced external and internal members.
- Madam also introduced one of the external BoS members Dr. B Sury, Professor, Indian Statistical Institute, Bengaluru who could not make it to attend the meeting due to personal reason. She mentioned, he had sent valuable suggestions through e-mail.
- She started the meeting by briefing the minutes of previous meeting.
- The Chairperson highlighted the activities and achievements of the department.

  She briefed the four new streams being introduced in I year UG program as per VTU

  Stream 1: CS, IS, CD, CY, AI-ML, BT

  Stream 2: EC, EE, EI, ET

  Stream 3: AS, CH, IM, ME

  Stream 4: CV
- She also briefed the UG/PG courses and Global Electives (GE) offered by DoM in previous scheme.

Agenda #	Discussions and Resolutions
9.2	Discussion of proposed new syllabus (22MA11B and 22MA21B) for I and II Semester of stream 1

- Dr. GJ presented new I and II semester syllabus (22MA11A, 22MA21A) for stream 1 (for CS, IS, AI & ML, CD, CY, BT programs). The title of I and II semester syllabus was proposed based on contents and the flow of topics for various units was discussed.
- She mentioned, 80% of syllabus must be common with VTU syllabus for equivalence purpose.
- Dr. GJ highlighted the usefulness of the contents in each unit.
- She also mentioned about the concept of Experiential Learning (EL) for earlier schemes and continuing to implement MATLAB as one of the EL components in the new scheme.
- She highlighted about the weightage of EL in CIE which is for 40 marks and to be split into two parts: 20 marks (MATLAB) and 20 marks (applications part), rubrics would be decided.
- Dr. B Sury (in absentia) suggested 'via e-mail' to include topic-Chinese remainder theorem in 'Elementary Number Theory' unit.
- Dr. P G Sideshwar and Dr. Arulalan appreciated the contents of the I year new syllabus and advised visualization to be done using PYTHON/MATLAB by giving small research-oriented problems to the

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- Dr. P G Sideshwar and Dr. Arulalan suggested to rename the title of I semester as 'Linear Algebra, Calculus and Statistics'.
- Dr. P G Sideshwar suggested changing the order of units in II semester syllabi and good question bank with different BTLs to be prepared.
- Dr. P G Sideshwar suggested revising unit II and unit III in II semester.
- Dr. Arulalan emphasized on teaching domain specific applications in all units and to set higher level questions like L_4, L_5 and L_6 in CIE.
- All the external BoS members expressed that syllabus is not huge and heavy for students, and also appreciated about the reference books.
- Dr. P G Sideshwar, Dr. Arulalan and Mr. Sanjay Venugopal suggested to teach domain specific applications in each unit. After discussion it was agreed to implement the changes by the BoS members.
- Dr. Harish M suggested, the discussion of 'Chinese remainder theorem' can be taken up in 'linear congruence' topic of Unit 1 in II Semester.

Agenda #	Discussions and Resolutions
9.3	Discussion of proposed new syllabus (22MA11B and 22MA21B) for I and II Semester of stream 2

- Dr. GJ presented new syllabus (22MA11B, 22MA21B) of I and II semester for stream 2, (EC, EE, EI, ET programs). The title of I and II semester syllabus were proposed based on contents and the flow of topics for various units was discussed.
- She highlighted the usefulness of the contents in each unit.
- She also mentioned about the concept of Experiential Learning (EL) for earlier schemes and continuing to implement MATLAB as one of the EL components in the new scheme.
- She highlighted about the weightage of EL in CIE which is for 40 marks and to be split into two parts: 20 marks (MATLAB) and 20 marks (applications part), rubrics would be decided.
- Dr. Arulalan, and Dr. P G Sideshwar appreciated the contents of the I and II semester new syllabus.
- Dr. Arulalan, and Dr. P G Sideshwar suggested to remove Beta and Gamma functions from syllabus and organize the contents of unit III and IV into III, IV and V units in II Semester syllabus. The title change was suggested for I Semester.
- Dr. C Nandeesh Kumar justified the tile of the course for I Semester.
- All the external BoS members expressed that syllabus is not huge and heavy for students, and appreciated about the reference books.
- Dr. P G Sideshwar, Dr. Arulalan and Mr. Sanjay Venugopal suggested to teach domain specific applications in each unit, introduce Laplace transform using the concept of logarithm property and include RLC circuit applications. After discussion it was agreed to implement the changes by the BoS members.

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Agenda #	Discussions and Resolutions
9.4	Discussion of proposed new syllabus (22MA11C and 22MA21C) for I and II Semester of stream 3

- Dr. GJ presented new syllabus (22MA11C, 22MA21C) of I and II semester for stream 3(AS, CH, IM, ME programs). The title of I and II semester syllabus was proposed based on contents and the flow of topics for various units was discussed.
- She highlighted the usefulness of the contents in each unit.
- She also mentioned about the concept of Experiential Learning (EL) for earlier schemes and continuing to implement MATLAB as one of the EL components in the new scheme.
- She highlighted about the weightage of EL in CIE which is for 40 marks and to be split into two parts: 20 marks (MATLAB) and 20 marks (applications part), rubrics would be decided.
- Dr. Arulalan, and Dr. P G Sideshwar appreciated the contents of the I and II semester new syllabus.
- Dr. Arulalan, and Dr. P G Sideshwar suggested to remove Beta and Gamma functions, half wave and full wave rectifier applications (Laplace transform) from syllabus and organize the contents of unit III and IV into III, IV and V units in II Semester syllabus.
- All the external BoS members expressed that syllabus is not huge and heavy for students, and appreciated about the reference books.
- Dr. P G Sideshwar, Dr. Arulalan and Mr. Sanjay Venugopal suggested to include domain specific applications in each unit. After discussion it was agreed to implement the changes by the BoS members.

Agenda #	Discussions and Resolutions
9.5	Discussion of proposed new syllabus (22MA11D and 22MA21D) for I and II Semester of stream 4

- Dr. GJ presented new syllabus (22MA11D, 22MA21D) of I and II semester for stream 4(CV program). The title of I and II semester syllabus was proposed based on contents and the flow of topics for various units was discussed.
- She highlighted the usefulness of the contents in each unit.
- She also mentioned about the concept of Experiential Learning (EL) for earlier schemes and continuing to implement MATLAB as one of the EL components in the new scheme.
- Chairperson highlighted about the weightage of EL in CIE which is for 40 marks and to be split into two parts: 20 marks (MATLAB) and 20 marks (applications part), rubrics would be decided.
- Dr. Arulalan, and Dr. P G Sideshwar suggested to recall the concept of determinants for 'Elementary Linear Algebra' unit and provide a link to structural engineering.
- Dr. Arulalan, and Dr. P G Sideshwar suggested to remove Beta and Gamma functions from syllabus and organize the contents of unit III and IV into III, IV and V units in II Semester syllabus.
- All the external BoS members expressed that syllabus is not huge and heavy for students, and also appreciated about the reference books.
- Dr. P G Sideshwar, Dr. Arulalan and Mr. Sanjay Venugopal suggested to add domain specific applications in each unit. After discussion it was agreed to implement the changes by the BoS members

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Agenda #	Discussions and Resolutions
9.6	Discussion on proposed new syllabus for PG, I Semester Cluster wise and II Semester Global Elective.

- Dr. GJ presented new syllabus for PG, I semester clusters A, B, C and D.
- Dr. Prakash presented the syllabus for PG, I semester cluster D prosed by DoM and Department of ECE (interdisciplinary) and II Semester Global elective syllabus. Contents and the flow of topics for various units was discussed.
- Dr. Arulalan, and Dr. P G Sideshwar suggested to modify Unit II, IV and V in cluster A.
- Dr. Arulalan, and Dr. P G Sideshwar suggested interchanging Unit I and Unit II, also Unit IV and Unit V in Cluster A syllabus.
- Dr. Arulalan, and Dr. P G Sideshwar suggested to add some reference book: Linear Algebra-Pure and Applied by Edgar Goodaire, Probability and Random Process for Electrical Engineering by A Leon Garcia, and include the content 'eigen subspace' in Linear Algebra Unit.
- Dr. Arulalan, and Dr. P G Sideshwar suggested to give case study related to industry as part of EL.
- Dr. P G Sideshwar, Dr. Arulalan and Mr. Sanjay Venugopal advised to add domain specific applications in each unit. After discussion it was agreed to implement changes by the BOS members.

Agenda #	Discussions and Resolutions
9.7	Other points discussed

- Dr. B Sury sent valuable suggestions through e-mail, which were discussed by the chairperson.
- Alumni (Mr. Sanjay Venugopal), has mentioned about the role of statistics in weather prediction, multi input and output process control model which can be considered for EL component. He also appreciated about the proposed new syllabus for 2022 scheme.
- The external members appreciated the efforts put by faculty of Mathematics department in framing syllabus for industry-oriented courses in Mathematics.
- They also expressed that it will be a huge task to deliver the content both for UG/PG in a good manner and offered their support in the process.
- The proposed new syllabus (UG and PG) and modification of Global Elective for PG were well appreciated by all members.
- Action taken points for the course end survey taken from the students of previous academic year were brought to the notice of the BoS members as given below:
  i. As per the opinion of the students it is required to reframe the experiential learning topics and modify the process of evaluation in future and MATLAB modules can be reframed and assessments may be done online mode.
- Chairperson concluded the presentation after thanking members for their valuable suggestions.

Meeting concluded with thanks to the chair.

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DEPARTMENT OF MATHEMATICS

BoS MEETING HELD ON 01-12-2022

Signature of members present:

Sl. No.	Internal Members	Signature
1.	Dr. G. Jayalatha, Chairman, Professor and HoD	
2.	Dr. Neeti Ghiya, Associate Professor	
3.	Dr. C. Nandeesh Kumar, Associate Professor	
4.	Dr. R. Prakash, Associate Professor	
5.	Mr. P L Rajashekar, Assistant Professor	
6.	Mrs. Sujatha A, Assistant Professor	

Sl. No.	External Members nominated by Academic Council	Signature
1.	Dr. Pradeep G Siddheshwar, Senior Professor Department of Mathematics, School of Science Central campus Christ (Deemed to be University) Bengaluru. Mob: 9449552834 Mail: mathdrpgs@gmail.com	

	VTU Nominee	
1.	Dr. Arulalan Rajan Faculty, Proficiency Programme Indian Institute of Science, Bengaluru. Mail: mraccecourses@gmail.com	01-12-2022

Sl. No.	Industry representative nominated by Principal	
1.	Sanjay Venugopal Manager-APC Solutions, Yokogawa IA Technologies India Ltd. Bengaluru. Mob: 9845075402 Mail: sanjay.venugopal@yti.yokogawa.com	

Jayalatha · G
Dr. G. Jayalatha
Chairman BoS (Maths)
HoD - Mathematics
PROFESSOR
Department of Mathematics
RVCE, Bangalore-560 059

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DEPARTMENT OF MATHEMATICS

Meeting #10

RVE/Maths/ /2022-2023

Board of Studies meeting

Minutes of meeting held on Thursday, 06th July 2023

Agenda	BoS meeting for the proposed 2022 scheme syllabi of III and IV semesters UG & higher semester global electives for 2021 scheme
Date	Thursday, 06th July 2023
Time	1.30pm
Venue	Department of Mathematics

Members on Board:

Sl. No	Category	No	Name of the person
1.	Chairperson	1	Dr. G. Jayalatha Prof. & Head, Dept. of Mathematics
2.	Faculty Members at different levels covering different specializations Nominated by Academic Council (5)	2	Dr. Neeti Ghiya Associate Professor, Dept. of Mathematics
		3	Dr. C. Nandeesh Kumar Asst. Professor, Dept. Of Mathematics
		4	Dr. Prakash R. Asst. Professor, Dept. Of Mathematics
		5	Prof. P L Rajashekhar Asst. Professor, Dept. Of Mathematics
		6	Dr. Sujatha A Asst. Professor, Dept. Of Mathematics
3.	Subject Experts from outside the college nominated by Academic Council (2)	1	Dr. Pradeep G Siddheshwar Senior Professor Department of Mathematics, School of Science Central campus Christ (Deemed to be University) Bengaluru.
4.	Expert from outside college - VTU nominee (1)	1	Dr. Arulalan Rajan Faculty, Proficiency Programme Indian Institute of Science, Bengaluru
5.	Representative from industry/Corporate sector/allied area relating to placement nominated by Academic Council. (1)	1	Mr. C R Patil Group Head, Electro-Optics, Lasers and Electronic warfare Central Research laboratory, BEL, Bangalore, India
6	Meritorious Alumnus Nominated by Principal	1	Sanjay Venugopal Manager – APC Solutions, Yokogawa IA Technologies India Ltd., Bangalore
7.	Special Invitee	1	Dr. Mahesha Narayana Senior Lecturer, Department of Mathematics, University of West Indies, Jamaica

DEPARTMENT OF MATHEMATICS

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06th July 2023

Dr. G Jayalatha, Chairperson of the Mathematics Board welcomed all members of the Board of Studies and briefed about the meeting agenda.
The following points were discussed:

Agenda #	Discussions and Resolutions
10.1	Welcome members of the board, read and record the minutes of previous meeting

- The BoS meeting started at 01.30 pm in the chamber of HoD of Mathematics, one external member Dr. P G Sideshwar, and special invitee Dr. Mahesha Narayana, seven internal BoS members were present and the remaining faculty members of the department were also asked to attend the meeting.
- Dr. GJ welcomed all the members and introduced external and internal BOS members.
- She started the meeting by briefing the minutes of previous meeting.
- The Chairperson highlighted the activities and achievements of the department.
- She briefed about the proposed 2022 scheme syllabi of III and IV semesters UG & higher semester global electives for 2021 scheme. The following are syllabi for III semester:

  Stream 1: EC, EE, EI, ET
  Stream 2: CS, IS, CD, CY
  Stream 3: AI&ML
  Stream 4: AS, CH, IM, ME , BT
  Stream 5: CV

  The following are syllabi for IV semester:

  Stream 1: EE, EI, ET
  Stream 2: AS, ME
- She also briefed the UG Global Electives (GE) offered by DoM for 2021 scheme.

Agenda #	Discussions and Resolutions
10.2	Discussion of proposed new III semester syllabi for all streams

- Dr. GJ presented III semester syllabus for stream 1 (for EC, EE, EI, ET programs), stream 2(for CS, IS, CD, CY programs), stream 3(AI & ML program), stream 4 (AS, CH, IM, ME, BT programs) and stream 5 (for CV program).
- The titles of all stream syllabi were proposed based on contents and the flow of topics for various units was discussed.
- Dr. GJ highlighted the usefulness of the contents for each unit.
- She also mentioned about the concept of Experiential Learning (EL) for earlier schemes and continuing to implement MATLAB as one of the EL components in the new scheme.
- She highlighted about the weightage of EL in CIE which is for 40 marks and to be split into two parts:

20 marks (MATLAB) and 20 marks (applications part), rubrics would be decided.

- Dr. C R Patil (in absentia) suggested 'via email' to include concepts of numerical methods for CS, AI, CD and CY programs.
- Chairperson mentioned the members about the above topics being covered in I year courses for these programs, and department will offer global elective for advanced numerical methods.
- Dr. C R Patil (in absentia) had suggested 'via email' to include concepts on 'Galios field' and 'extension field' in Linear algebra units for Stream 1
- Chairperson mentioned the above concepts would be introduced in their core courses and same may be considered in experiential learning.
- Dr. P G Sideshwar and Dr. Arulalan (in absentia) suggested via Email to include proof of 'convolution theorem' in Laplace transform unit for stream 4 and proof of 'rank-nullity theorem' in Linear Algebra for stream 1
- Dr. P G Sideshwar suggested modifying the content of Fourier transform unit in Stream 1 syllabus.
- Dr. Arulalan (in absentia) suggested removing Fourier integral theorem, and begin the unit by Complex Fourier transform from infinite Fourier series. He also suggested to remove Fourier sine transform and to include Discrete Fourier Transform and Fast Fourier Transform, retain cosine transform in the unit.
- Dr. P G Sideshwar suggested the title for Stream 4 as " Mathematics for Engineering Applications"
- Dr. Arulalan, Dr. C R Patil (in absentia) and Dr. P G Sideshwar suggested changing the order of reference books in all stream syllabi.
- Dr. Mahesha Narayana suggested to include 'Linear Algebra with Applications' by Steven J Leon
- Dr. P G Sideshwar and Dr. Arulalan (in absentia) suggested removal of 'Higher Engineering Mathematics' by B S Grewal and 'Advanced Engineering Mathematics' by Erwin Kreyszig as reference book for stream 4 and stream 5.
- Dr. Arulalan (in absentia) suggested to have 'The Fast Fourier Transform- An Introduction to its Theory and Applications' by Oran Brigham as reference book.
- Dr. Arulalan (in absentia) suggested to have 'Mathematics for Machine Learning' by Marc Peter Deisenroth as reference book for AI&ML stream.
- After discussion it was agreed to implement the changes suggested by the BoS members

Agenda #	Discussions and Resolutions
10.3	Discussion of proposed new IV semester syllabi for EE, EI, ET, AS, ME programs

- Dr. GJ presented new syllabus of IV semester for stream 1 (EE, EI, ET programs) and stream 2 (AS, ME programs)
- The titles of all stream syllabuses were proposed based on contents and the flow of topics for various units was discussed.
- She highlighted the usefulness of the contents in each unit.
- She also mentioned about the concept of Experiential Learning (EL) for earlier schemes and continuing to implement MATLAB as one of the EL components in the new scheme.
- She highlighted about the weightage of EL in CIE which is for 40 marks and to be split into two parts: 20 marks (MATLAB) and 20 marks (applications part), rubrics would be decided.

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- Dr. P G Sideshwar and Dr. Arulalan (in absentia) suggested to modify the title as 'Probability theory and Statistics' for Stream 2.
- Dr. P G Sideshwar and Dr. Arulalan (in absentia) suggested to modify the title as 'Probability theory and Linear Programming ' for Stream 1.
- Dr. P G Sideshwar and Dr. Arulalan (in absentia) suggested change the order of the units, removal of Weibul distribution and include geometric distribution, uniform distribution.
- After discussion it was agreed to implement the changes suggested by the BoS members
- Dr. P G Sideshwar and Dr. Arulalan (in absentia) raised queries on exclusion of 'Probability theory' for EC, AI&ML students. Chairperson stated it would be offered by respective department itself.
- Dr. Arulalan (in absentia) suggested to include Vector Calculus for AI & ML students. Chairperson stated it is already included in first year syllabi.
- Dr. P G Sideshwar and Dr. Arulalan (in absentia) suggested to modify the contents of probability distributions unit. It was suggested to change 'cumulative density function' as 'cumulative distribution function
- Dr. Arulalan, Dr. C R Patil (in absentia) and Dr. P G Sideshwar suggested changing the order of reference books in all stream syllabuses.
- Dr. Arulalan (in absentia) suggested to have reference books by Sheldon M Ross for all streams on 'Probability'
- Dr. Arulalan (in absentia) suggested to have 'Fundamentals of Applied Probability and Random Processes' by Oliver C Ibe as reference book
- After discussion it was agreed to implement the changes suggested by the BoS members

Agenda #	Discussions and Resolutions
10.4	Discussion of proposed new higher semester global electives for 2021 scheme.

- Dr. GJ presented new proposed global elective syllabus for 2021 scheme. The titles of the syllabus were proposed based on contents and the flow of topics for various units was discussed.
- She highlighted the usefulness of the contents in each unit.
- The chairperson briefed about the proposed modification in existing global elective syllabus of existing schemes.
- The syllabus for new global electives on 'Data Science for Engineer, Mathematical Foundation for cyber security, Financial Mathematics, Graph Theory, Fuzzy Sets and its Applications' was proposed and discussed.
- Dr. Mahesha Narayana, Dr. P G Sideshwar, Dr. Arulalan, and Dr. C R Patil (in absentia) suggested removal of reference book by B S Grewal.

- **III & IV Semester Proposed Titles:**
- Linear algebra, Fourier transforms and statistics EC,EE, EI, ET
- Statistics, Laplace transform and numerical methods AS, BT, CH, IM, ME
- Linear algebra and probability theory CD,CS,CY,IS
- Applied mathematics for civil engineering CV
- Mathematics for artificial intelligence & machine learning AI & ML
- Probability Theory and Linear Programming EI, ET, ME, CV, AS

VI semester Global Elective: Mathematical Modelling

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Agenda #	Discussions and Resolutions
10.5	Other points discussed

- Dr. P G Sideshwar suggested offering a certification course on 'Engineering Mathematics with Industrial Application' taking inputs from Dr. Arulalan, as this may create job opportunities for students.
- Dr. P G Sideshwar suggested to have 'Advanced Engineering Mathematics' by Dennis G Zill, Warren S as reference book for all streams.
- The Chairperson told 'reference books' suggested by BoS external members will be included suitably and reference book by B S Grewal will be removed for few courses and eventually from all courses.
- Action taken points for the course end survey taken from the students of previous academic year were brought to the notice of the BoS members as given below:

i. The syllabus will be revised to include more relevant content applicable across various branches of engineering in the upcoming update.
ii. The evaluation of experiential learning can be enhanced through seminars, model creation, and MATLAB assessments, with an increased focus on online assignment problems.

- Chairperson concluded the presentation after thanking members for their valuable suggestion

Meeting concluded with thanks to the chair.

DEPARTMENT OF MATHEMATICS

BoS MEETING HELD ON 06-07-2023

Signature of members present:

Sl. No.	Internal Members	Signature
1.	Dr. G. Jayalatha, Chairman, Professor and HoD	
2.	Dr. Neeti Ghiya, Associate Professor	
3.	Dr. C. Nandeesh Kumar, Associate Professor	
4.	Dr. R. Prakash, Associate Professor	
5.	Mr. P L Rajashekar, Assistant Professor	
6.	Mrs. Sujatha A, Assistant Professor	

Sl. No.	External Members nominated by Academic Council	Signature
1.	Dr. Pradeep G Siddheshwar, Senior Professor Department of Mathematics, School of Science Central campus Christ (Deemed to be University) Bengaluru. Mob: 9449552834 Mail: mathdrpgs@gmail.com	
Sl. No.	**Special Invitee**	
1.	Dr. Mahesha Narayana Senior Lecturer, Department of Mathematics, University of the West Indies, Jamaica Mail: mahesha.narayana@uwimona.edu.jm	

Dr. G. Jayalatha
Chairman BoS (Maths)
HoD - Mathematics
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