



RAMAIAH
Institute of Technology

CURRICULUM

for the Academic year 2017 – 2018

COMMON TO ALL BRANCHES

I & II SEMESTER

RAMAIAH INSTITUTE OF TECHNOLOGY
(Autonomous Institute, Affiliated to VTU)
BANGALORE – 560054.

RAMAIAH INSTITUTE OF TECHNOLOGY, BANGALORE – 560 054

(Autonomous Institute, Affiliated to VTU)

Ramaiah Institute of Technology (RIT) (formerly known as M. S. Ramaiah Institute of Technology) is a self-financing institution established in Bangalore in the year 1962 by the industrialist and philanthropist, Late Dr. M S Ramaiah. The Institute is accredited with A grade by NAAC in 2016 and all engineering departments offering bachelor degree programs have been accredited by NBA. RIT is one of the few institutes with faculty student ratio of 1:15 and achieves excellent academic results. The institute is a participant of the Technical Education Quality Improvement Program (TEQIP), an initiative of the Government of India. All the departments are full with competent faculty, with 100% of them being postgraduates or doctorates. Some of the distinguished features of RIT are: State of the art laboratories, individual computing facility to all faculty members. All research departments are active with sponsored projects and more than 130 scholars are pursuing PhD. The Centre for Advanced Training and Continuing Education (CATCE), and Entrepreneurship Development Cell (EDC) have been set up on campus. RIT has a strong Placement and Training department with a committed team, a fully equipped Sports department, large air-conditioned library with over 80,000 books with subscription to more than 300 International and National Journals. The Digital Library subscribes to several online e-journals like IEEE, JET etc. RIT is a member of DELNET, and AICTE INDEST Consortium. RIT has a modern auditorium, several hi-tech conference halls, all air-conditioned with video conferencing facilities. It has excellent hostel facilities for boys and girls. RIT Alumni have distinguished themselves by occupying high positions in India and abroad and are in touch with the institute through an active Alumni Association. RIT obtained Academic Autonomy for all its UG and PG programs in the year 2007. As per the National Institutional Ranking Framework, MHRD, Government of India, Ramaiah Institute of Technology has achieved 45th rank in 2017 among the top 100 engineering colleges across India and occupied No. 1 position in Karnataka, among the colleges affiliated to VTU, Belagavi.

VISION OF THE INSTITUTE

To evolve into an autonomous institution of international standing for imparting quality technical education.

MISSION OF THE INSTITUTE

MSRIT shall deliver global quality technical education by nurturing a conducive learning environment for a better tomorrow through continuous improvement and customization.

QUALITY POLICY

We at M.S. Ramaiah Institute of Technology, strive to deliver comprehensive, continually enhanced, global quality technical and management education through an established Quality Management System complemented by the synergistic interaction of the stakeholders concerned.

VISION AND MISSION OF THE DEPARTMENTS:

DEPARTMENT OF MATHEMATICS

VISION

To mould the students to have strong Mathematical and analytical skills to meet the challenges open to them.

MISSION

To provide the students with a strong Mathematical foundation through course which cater to the needs of Industry, research and higher education.

DEPARTMENT OF CHEMISTRY

VISION

Department strives for development of curriculum viewing emerging trends in technology with a balanced approach towards Institute Industry interaction and academic excellence along with research in basic sciences.

MISSION

Providing outstanding teaching and quality training in chemistry to all students at all levels and in all disciplines and also develop and maintain research programs of national and international relevance and serve the society through unique expertise and talent found in the department.

DEPARTMENT OF PHYSICS

VISION

To develop undergraduate courses of best academic standards comparable to universities of international repute and be a catalytic agent to help students to manifest their latent potential.

MISSION

To provide the best training through teaching and research to enable the students to master the concepts in physics and apply successfully to real time problems and kindle their interest in cutting edge research areas.

DEPARTMENT OF HUMANITIES

VISION

The department of Humanities, MSRIT aspires to achieve excellence in teaching and training the young engineering students in the areas of humanities and social sciences through outcomes based quality education and nurture them to emerge as professional leaders, lifelong learners and responsible citizens of global community.

MISSION

The mission of the department is to offer courses that aim to strengthen the students' creative and critical thinking, problem solving abilities, communication skills and broaden intellectual perspectives, to understand and deal with social realities through continuous learning experiences.

PROGRAM OUTCOMES (POs):

- PO1:**Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2:**Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3:**Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6:** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8:** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9:** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10:**Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11:** Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.
- PO12:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Faculty List:**· Department of Mathematics**

Sl. No.	Name	Qualification	Designation
1	Dr. N. L. Ramesh	M.Sc., Ph.D	Professor & HOD
2	Dr. V. Ramachandramurthy	M.Sc., Ph.D	Professor & I Year Coordinator
3	Dr. S. H. C. V. Subba Bhatta	M.Sc., M.Phil., Ph.D	Professor
4	Dr. G. Neeraja	M.Sc., Ph.D	Professor
5	Dr. Monica Anand	M.Sc., Ph.D	Associate Professor
6	Dr. Dinesh. P. A	M.Sc., M.Sc (IT)., M.Phil., Ph.D	Associate Professor
7	Dr. M. V. Govindaraju	M.Sc., Ph.D	Assistant Professor
8	Mr. Vijaya Kumar	M.Sc., (Ph.D)	Assistant Professor
9	Dr. A. Sreevallabha Reddy	M.Sc., Ph.D	Assistant Professor
10	Mr. R. Suresh Babu	M.Sc., (Ph.D)	Assistant Professor
11	Dr. M. S. Basavaraj	M.Sc., Ph.D	Assistant Professor
12	Mr. Azghar Pasha. B	M.Sc., (Ph.D)	Assistant Professor
13	Mr. Aruna. A. S	M.Sc., (Ph.D)	Assistant Professor
14	Mr. Girinath Reddy. M	M.Sc., (Ph.D)	Assistant Professor
15	Mrs. Uma. M	M.Sc., (Ph.D)	Assistant Professor
16	Mr. S Ram Prasad	M.Sc., (Ph.D)	Assistant Professor
17	Ms. Kavitha. N	M.Sc., (Ph.D)	Assistant Professor
18	Mrs. Sushma. S	M.Sc., (Ph.D)	Assistant Professor
19	Dr. Nancy Samuel	M.Sc., M.Phil., Ph.D	Assistant Professor
20	Dr. Kalyan Chakravarthy	M.Sc., Ph. D	Assistant Professor

· **Department of Physics**

Sl. No.	Name	Qualification	Designation
1	Dr. A. Jagannatha Reddy	M.Sc., M.Phil., Ph.D	Associate Professor & HOD
2	Dr. K. Seshadri	M.Sc., Ph.D	Professor
3	Dr. Seema Agarwal	M.Sc., M.Phil., Ph.D	Associate Professor
4	Dr. Ravindra M Melavanki	M.Sc., Ph.D	Assistant Professor
5	Dr. Sandhya. K. L	M.Sc., Ph.D	Assistant Professor
6	Dr. Nagesh. B. V	M.Sc., Ph.D	Assistant Professor
7	Dr. G. N. Anil Kumar	M.Sc., Ph.D	Assistant Professor
8	Dr. Siddlingeshwar	M.Sc., Ph.D	Assistant Professor
9	Dr. S. Vijayanthimala	M.Sc., Ph.D	Assistant Professor
10	Dr. Kalpana Sharma	M.Sc., Ph.D	Assistant Professor

· **Department of Chemistry**

Sl. No.	Name	Qualification	Designation
1	Dr. B. M. Nagabhushana	M.Sc., Ph.D	Professor & HOD
2	Prof. B. S. Durgakeri	M.Sc	Visiting Professor
3	Dr. Nagaraju Kottam	M.Sc., Ph.D	Associate Professor
4	Dr. M.N. Manjunatha	M.Sc., Ph.D	Assistant Professor
5	Dr. P. Muralikrishna	M.Sc., Ph.D	Assistant Professor
6	Mr. Basappa C Yallur	M.Sc., (Ph.D)	Assistant Professor
7	Dr. Malathi Challa	M.Sc., Ph.D	Assistant Professor
8	Dr. Sharanabasappa Patil	M.Sc., Ph.D	Assistant Professor
9	Dr. R. Hari Krishna	M.Sc., Ph.D	Assistant Professor

· **Department of Humanities**

Sl. No.	Name	Qualification	Designation
1	Mrs. Premila Swamy. D	M.A., (Ph.D)	Asst. Professor & I/C HOD
2	Mrs. Kanya Kumari. S	M.A., (M.Phil)	Faculty
3	Mr. Uday Kumar. H. M	M.A., MBA., (Ph.D)	Faculty
4	Mr. Neelappa Talwar	M.A	Guest Faculty
5	Mrs. Kavitha S.N.	L.L.M	Guest Faculty

RAMAIAH INSTITUTE OF TECHNOLOGY, BANGALORE – 560 054
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SCHEME OF TEACHING FOR THE ACADEMIC YEAR 2017 – 2018

Branches: CS, EC, IT, CH, ML and IS I SEMESTER B.E.

PHYSICS CYCLE

Sl. No.	Subject Code	Subject	Teaching Department	Credits					Contact Hours	Marks		
				L	T	P	S	Total		CIE	SEE	Total
1	MAT101	Engineering Mathematics – I	Mathematics	3	1	0	0	4	5	50	50	100
2	PHY101	Engineering Physics	Physics	3	1	0	0	4	5	50	50	100
3	PHYL101	Engineering Physics Lab	Physics	0	0	1	0	1	2	50	50	100
4	CV101	Basic Civil Engineering and Mechanics	Civil Engineering	3	1	0	0	4	5	50	50	100
5	EE101	Basic Electrical Engineering	Electrical & Electronics Engineering	4	0	0	0	4	4	50	50	100
6	CS101	Fundamentals of Computing	Computer Science Engg. / Information Science Engg.	2	1	0	0	3	4	50	50	100
7	CSL101	Fundamentals of Computing Lab	Computer Science Engg. / Information Science Engg.	0	0	1	0	1	2	50	50	100
8	HSS103	Professional Communication	Humanities	2	0	0	0	2	2	50	50	100
9	ME102	Computer Aided Engineering Drawing	Mechanical Engineering	0	1	1	0	2	4	50	50	100
			Total	17	5	3	0	25	33	450	450	900

L – Lecture (One Hour)

T – Tutorial (Two Hours)

P – Practical (Two Hours)

S – Self Study

* Non Credit Mandatory Course

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SCHEME OF TEACHING FOR THE ACADEMIC YEAR 2017 – 2018

II SEMESTER B.E.

Sl. No.	Subject Code	Subject	Teaching Department	Credits					Contact Hours	Marks		
				L	T	P	S	Total		CIE	SEE	Total
1	MAT201	Engineering Mathematics – II	Mathematics	3	1	0	0	4	5	50	50	100
2	CHY201	Engineering Chemistry	Chemistry	3	1	0	0	4	5	50	50	100
3	CHYL201	Engineering Chemistry Lab	Chemistry	0	0	1	0	1	2	50	50	100
4	ME201	Elements of Mechanical Engineering	Mechanical Engineering	4	0	0	0	4	4	50	50	100
5	EC201	Basic Electronics	Electronics, Telecommunication, Instrumentation, Medical Electronics	4	0	0	0	4	4	50	50	100
6	HSS201	Constitution of India & Professional Ethics	Humanities	2	0	0	0	2	2	50	50	100
7	HSS202	Environmental Studies	Civil Engineering	2	0	0	0	2	2	50	50	100
8	HSS204*	Kannada	Humanities	2	0	0	0	0	2	50	50	100
9	MEL203	Workshop Practice	Mechanical Engineering	0	1	1	0	2	4	50	50	100
10	AL201	Engineering Design	Respective Departments	0	1	1	0	2	4	50		50
			Total	20	4	3	0	25	34	500	450	950

L – Lecture (One Hour)

T – Tutorial (Two Hours)

P – Practical (Two Hours)

S- Self Study

* Non Credit Mandatory Course

RAMAIAH INSTITUTE OF TECHNOLOGY, BANGALORE – 560 054
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SCHEME OF TEACHING FOR THE ACADEMIC YEAR 2017 – 2018

Branches: ME, IM, TC, CV, EE and BT

I SEMESTER B.E.

CHEMISTRY CYCLE

Sl. No.	Subject Code	Subject	Teaching Department	Credits					Contact Hours	Marks		
				L	T	P	S	Total		CIE	SEE	Total
1	MAT101	Engineering Mathematics – I	Mathematics	3	1	0	0	4	5	50	50	100
2	CHY101	Engineering Chemistry	Chemistry	3	1	0	0	4	5	50	50	100
3	CHYL101	Engineering Chemistry Lab	Chemistry	0	0	1	0	1	2	50	50	100
4	ME101	Elements of Mechanical Engineering	Mechanical Engineering	4	0	0	0	4	4	50	50	100
5	EC101	Basic Electronics	Electronics, Telecommunication, Instrumentation, Medical Electronics	4	0	0	0	4	4	50	50	100
6	HSS101	Constitution of India & Professional Ethics	Humanities	2	0	0	0	2	2	50	50	100
7	HSS102	Environmental Studies	Civil Engineering	2	0	0	0	2	2	50	50	100
8	HSS104*	Kannada	Humanities	2	0	0	0	0	2	50	50	100
9	MEL103	Workshop Practice	Mechanical Engineering	0	1	1	0	2	4	50	50	100
10	AL101	Engineering Design	Respective Departments	0	1	1	0	2	4	50		50
		Total	Total	20	4	3	0	25	34	500	450	950

L – Lecture (One Hour) T – Tutorial (Two Hours) P – Practical (Two Hours) S – Self Study * Non Credit Mandatory Course

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SCHEME OF TEACHING FOR THE ACADEMIC YEAR 2017 – 2018

II SEMESTER B.E.

Sl. No.	Subject Code	Subject	Teaching Department	Credits					Contact Hours	Marks		
				L	T	P	S	Total		CIE	SEE	Total
1	MAT201	Engineering Mathematics – II	Mathematics	3	1	0	0	4	5	50	50	100
2	PHY201	Engineering Physics	Physics	3	1	0	0	4	5	50	50	100
3	PHYL201	Engineering Physics Lab	Physics	0	0	1	0	1	2	50	50	100
4	CV201	Basic Civil Engineering and Mechanics	Civil Engineering	3	1	0	0	4	5	50	50	100
5	EE201	Basic Electrical Engineering	Electrical & Electronics Engineering	4	0	0	0	4	4	50	50	100
6	CS201	Fundamentals of Computing	Computer Science Engg. / Information Science Engg.	2	1	0	0	3	4	50	50	100
7	CSL201	Fundamentals of Computing Lab	Computer Science Engg. / Information Science Engg.	0	0	1	0	1	2	50	50	100
8	HSS203	Professional Communication	Humanities	2	0	0	0	2	2	50	50	100
9	ME202	Computer Aided Engineering Drawing	Mechanical Engineering	0	1	1	0	2	4	50	50	100
		Total	Total	17	5	3	0	25	33	450	450	900

L – Lecture (One Hour)

T – Tutorial (Two Hours)

P – Practical (Two Hours)

S – Self Study

* Non Credit Mandatory Course

ENGINEERING MATHEMATICS - I

Course code : **MAT101**

Credits : **3 : 1 : 0 : 0**

Course coordinator/s : **Dr. S.H.C.V. Subba Bhatta &**

Contact hours : **42L+14T**

Dr. M.V. Govindaraju

Unit I

Differential Calculus - I : Polar curves, angle between the radius vector and the tangent, angle between the curves, length of perpendicular from pole to the tangent, pedal equations.

Partial Differentiation: Partial derivatives, Euler's theorem. Total differential coefficient, differentiation of composite and implicit functions, Jacobians and properties.

Unit II

Integral Calculus - I : Reduction formulae, $\sin^n x$, $\cos^n x$, $\sin^m x \cos^n x$, evaluation of these integrals with standard limits, Tracing of curves (both Cartesian and polar).

Application of integration – length of arc of a curve, plane areas, volumes and surface area of revolution. Rule of differentiation under integral sign.

Unit III

Integral Calculus - II : Multiple integrals- evaluation of double and triple integrals, change of order of integration, change of variables. Applications of double and triple integrals to find areas and volumes.

Unit IV

Vector differentiation : Vector functions of a single variable, derivative of a vector function, geometrical interpretation, velocity and acceleration.

Scalar and vector fields, gradient of a scalar field, directional derivative, divergence of a vector field, solenoidal vector, curl of a vector field, irrotational vector, Laplacian operator.

Vector identities (Standard vector identities).

Unit V

Vector integration: Line integrals, surface integrals and volume integrals. Green's theorem (with proof) and its applications, Stokes' theorem (without proof), and its applications, Gauss divergence theorem (without proof) and its applications.

Text Books :

1. **G.V. Thomas & Finney** – Calculus & Analytical Geometry, Pearson, 12th Edition, 2017.
2. **B.S. Grewal** – Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2015.

Reference Books:

1. **Erwin Kreyszig** –Advanced Engineering Mathematics, Wiley publication, 10th Edition, 2015.
2. **Peter V. O' Neil** – Advanced Engineering Mathematics, Thomson Brooks/Cole, 7th Edition, 2011.
3. **Glyn James** - Advanced Modern Engineering Mathematics, Pearson Education, 4th Edition, 2010.
4. **George B. Thomas, Maurice D. Weir, Joel Hass** – Thomas Calculus, Pearson, 13th Edition, 2014.

Course Outcomes :

1. Apply the knowledge of calculus and multivariate calculus to solve problems related to polar curves, composite functions and Jacobians (PO1, PO2).
2. Analyze guiding properties of the curve to trace the curve and use integration to find the application of those plane curves (PO1, PO2).
3. Apply the concept of change of variables and change of order of integration to evaluate multiple integrals. Use multiple integrals to find areas and volumes (PO1, PO2).
4. Apply the knowledge of vector differentiation to identify solenoidal and irrotational vectors and solve problems using vector identities (PO1, PO2).
5. Exhibit the interdependence of line, surface and volume integrals using integral theorems (PO1, PO2).

ENGINEERING PHYSICS

Course code : **PHY 101 / 201**

Credits : **3 : 1 : 0 : 0**

Course coordinator/s : **Dr. Sandhya K.L**

Contact hours : **42L+14T**

Unit I

Crystal structure : Forces between atoms — Cohesion of atoms and equilibrium atomic spacing-Expression for cohesive energy. Crystal structure -Space lattice --unit cell, primitive cell, Bravais lattice and crystal systems- Determination of Miller indices of Crystal planes—Inter planar spacing - Bragg's law and applications –Powder and single crystal X-ray diffraction methods for cubic unit cells – Crystal structure of NaCl and Diamond.

Unit II

Elasticity and Vibrations : Elasticity—Introduction -Hooke's law — Poisson's ratio— Derivations for Y , K , n in terms of linear and lateral strains-Relationship between Y , k , n and σ – Torsion of a cylinder and determination of couple per unit twist—Torsion pendulum—Determination of rigidity modulus using torsion pendulum -Bending moment of a beam (qualitative)– Cantilever loaded at free end.

Vibrations - Introduction to vibrations—Analysis of Free and damped vibrations –under, over and critical damping—logarithmic decrement and quality factor—Forced vibrations and Resonance —LCR circuits and electrical resonance.

Unit III

Concepts of Modern Physics and Quantum Mechanics: Particle nature of electromagnetic radiation-Discussion of Blackbody spectrum-Wien's law, Rayleigh Jeans law, Stefan - Boltzman law and Planck's law (qualitative)-Deduction of Wien's law and Rayleigh Jeans law from Planck's law - Compton effect .**Wave nature of particles**—De-Broglie waves-Phase and group velocities-Expression for group velocity from superposition principle-Equivalence of group velocity to velocity of particle-Relationships between phase velocity and group velocity in dispersive and non dispersive media-Heisenberg's uncertainty relationships-Applications (intrinsic line width of spectral lines and non confinement of electrons in atomic nucleus)-characteristics of a well behaved wave function-Born approximation and normalization of the wave function-Setting up of one dimensional time independent Schrodinger's wave equation from classical wave equation-Particle in an infinite one dimensional potential well.

Unit IV

Electrical conduction in solids : Metals— Classical free electron theory of metals - Expression for electrical conductivity -Drawbacks of classical free electron theory - Quantum free electron theory-Density of energy states in a metal-Fermi energy at 0 K-Effect of temperature on Fermi-Dirac Distribution function-Effect of temperature on $f(E)$, $n(E)$ vs E and $g(E)$ vs E graphs. Merits of quantum free electron theory.

Semiconductors: Formation of energy bands in solids (qualitative)-Density of energy states in conduction and valence bands of a semiconductor - Thermal equilibrium concentration of electrons in conduction band - Intrinsic carrier concentration - Hall effect.

Unit V

Lasers and Optical fibers : Lasers-Interaction of radiation with matter—Absorption—spontaneous emission and stimulated emission--Expression for energy density of radiation in terms of Einstein coefficients at thermal equilibrium—Requisites of a laser system-- Three and four level lasers--Principle and operation of He-Ne and semiconductor Lasers – Holography.

Optical Fibers - Propagation mechanisms in optical fibers, Angle of acceptance and Numerical aperture –Types of optical fibers - Step index and graded index fibers - Intermodal dispersion - Attenuation in optical fibers - Optical fiber communication system (Block diagram).

Text Books :

1. **Gaur and Gupta** - A Textbook of Engineering Physics, Dhanpat Rai Publishers, New Delhi, 8th revised Edition, 2015.
2. **Arthur Beiser** - Concepts of Modern Physics, Tata McGraw Hill, 6th Edition, 2009.
3. **S.O. Pillai** - Solid State Physics, New Age International, 7th Edition, 2015.

Reference Books :

1. **B.B. Laud** - Lasers and non-linear optics, New Age International, 3rd Edition, 2015.
2. **Donald A Neamen** - Semiconductor Physics and Devices, Tata McGraw Hill, 4th Edition, 2012.
3. **D.S. Mathur** - Elements of properties of matter, S.Chand and company, 11th Edition, 2013.
4. **S.P. Basavaraju** - Engineering Physics, Subhas stores, 2014.

Course Outcomes :

1. Apply the concepts to designate crystal planes and use Bragg's law to identify different types of cubic crystals (PO1).
2. Analyze elastic moduli in different cases and enumerate free, damped and forced vibrations (PO1).
3. Distinguish between phase and group velocities; solve Schrödinger's time independent wave equation for the case of infinite potential well (PO1).
4. Apply the quantum theory to understand the electrical conductivity of metals and calculate carrier concentration in metals and semiconductors (PO1).
5. Enumerate the construction and working of simple laser systems, holography, distinguish between different types of optical fibers and apply the concepts to optical communication system (PO1).

ENGINEERING PHYSICS LABORATORY

Course code : **PHYL 101 / 201**

Credits : **0 : 0 : 1 : 0**

Course coordinator/s : **Dr. Nagesh B.V**

Contact hours : **14P**

1. General Instructions and Introduction to Error Analysis.
2. Plotting of forward and reverse bias characteristics of a Zener Diode and determination of breakdown voltage.
3. Determination of input, output and transfer characteristics of a transistor and calculation of values.
4. Measurement of capacitance and dielectric constant of a capacitor by charging and discharging it through a resistor.
5. Calculation of Planck's constant using LEDs.
6. Verification of Stefan's law.
7. Identification of different components (L,C or R) of a Black Box and calculation of their values through frequency response curves.
8. Determination of Moment of inertia of an irregular body and calculation of rigidity modulus of the material of the suspension wire using torsional oscillations.
9. Measurement of Young's Modulus of the material of the single cantilever beam.
10. Determination of Energy gap of semiconductor.
11. Calculation of constituent wavelengths of mercury spectrum using Diffraction Grating in Minimum Deviation position.
12. Determination of Fermi energy of a metal.
13. Measurement of operating wavelength of semiconductor laser using Laser diffraction.
14. Measurement of radius of curvature of a lens by Newton's rings method.
15. Calculation of thickness of given paper strip by the method of interference fringes. (Air wedge).
16. Frequency response of series and parallel LCR circuits and calculation of Q-factor and band width.
17. Determination of Hall coefficient and concentration of charge carriers of the semiconductor.
18. Analysis of X-ray powder photograph and determination of lattice constant by Debye-Scherrer method.
19. Simulation of electrical experiments using Pspice.

- Students are required to perform 12 prescribed experiments (from 1 to 18) in the above list.
- Experiment 19 is compulsory for all students.

Reference Books:

1. Laboratory manual prepared by the Physics department, RIT, Bangalore.

Course Outcomes :

1. Determine elastic constants of material using torsion pendulum and cantilever (PO1, PO4).
2. Apply the concepts of interference and diffraction of light to determine thickness of thin films and wavelength of light (PO1, PO4).
3. Construct and analyze simple AC and DC circuits to determine electrical parameters, familiarity with the concepts of modern Physics (PO1, PO4, PO5).

BASIC CIVIL ENGINEERING AND MECHANICS

Course code : **CV101/201**

Credits : **3 : 1 : 0 : 0**

Course coordinator/s : **Sri. K V Manjunath**

Contact hours : **42L+14T**

Unit I

Scope of different fields of Civil Engineering – Structural Engg, Geotechnical Engg, Environmental Engg, Water Resources Engg., Transportation Engg. Materials of construction - Stones, Bricks, Tiles, Timber, PCC, RCC, PSC and composite materials.

Unit II

Introduction to Engineering Mechanics – Rigid and Flexible or deformable bodies, Definition of Force, classification of force systems, couples and their characteristics, Composition (resultant) and resolution (components) of forces, Resultant of coplanar concurrent and non concurrent force systems.

Unit III

Equilibrium of coplanar concurrent and non-concurrent systems of forces, conditions of equilibrium, types of loads and supports, types of beams and trusses. Support Reactions of statically determinate beams and trusses.

Unit IV

Definition of centroid and centre of gravity, Centroid of simple planar figures, centroid of built up sections, Moment of inertia / Second Moment of area, radius of gyration, Parallel axis theorem and Perpendicular axis theorem, MI of compound areas, Polar MI and radius of gyration.

Unit V

Friction: Introduction, Laws of static friction, limiting friction, angle of friction, angle of repose, block friction on horizontal and inclined planes, ladder friction and wedge friction.

Text Books :

1. **Syed Shakeeb Ur Rahman and V. Madhava Rao** - Elements of Civil Engineering & Engineering Mechanics, Sanguina Technical Publishers, Bangalore.
2. **M.N Shesha Prakash, Ganesh B. Mogaveer** - Elements of Civil Engineering and Engg. Mechanics, PHI Learning Private Ltd, New Delhi.

Reference Books :

1. **S.S. Bhavikatti and S.K. Duggal** - Elements of Civil Engineering & Engineering Mechanics, New Age International, New Delhi.
2. **B.K.Kolhapure** - Elements of Civil Engineering and Engineering Mechanics, Eastern Book Promoters, Belgaum.

Course Outcomes :

1. Understand the scope of different fields of civil engineering and also know the desirable properties and uses of some building materials (PO10).
2. Resolve any force into its components and determine the resultant of concurrent and non – concurrent system of forces (PO1, PO2, PO3).
3. Determine the equilibrant of any force system and also determine the unknown reactions using free body diagrams (PO1, PO2, PO3).
4. Understand the concept of centroid and moment of inertia and calculate the centroid and M.I. of composite areas (PO1, PO2, PO3).
5. Understand the importance of laws of static friction and its applications (PO1, PO2,PO3).

BASIC ELECTRICAL ENGINEERING

Course code : **EE 101/201**

Credits : **4 : 0 : 0 : 0**

Course coordinator/s : **Smt. K.N. Prasanna & Sri. Gurunayk Nayak** Contact hours : **56L**

Unit I

Introduction to generation, transmission and distribution of electrical energy, circuit protective devices, and safety precautions.

Electromagnetism : Magneto Motive Force, Permeability, Reluctance, comparison of electric and magnetic circuits. Statically and dynamically induced EMF, self-inductance, mutual inductance, coupling co-efficient, energy stored in the magnetic field of an inductor.

D.C. Circuits: Independent voltage and current source, Ohm's law, limitations of Ohm's law, Kirchhoff's laws and their applications to circuits.

Unit II

Single phase circuits : Sinusoidal AC voltage, average and rms values, form factor, peak factor, voltage, current, power and power factor, significance of power factor. Analysis of circuits with R, L, C, RL, RC, RLC for series and parallel configurations.

Unit III

Three phase circuits : Necessity and advantages of three phase systems, star-delta connection, relationship between line and phase values, measurement of 3-phase power using two wattmeter method, expression for power factor in terms of watt meter readings.

Power and Energy Measurement: Dynamometer type wattmeter, Induction type energy meter.

Unit IV

DC generator : Working principle, constructional features, EMF equation.

DC motors : Constructional details, mechanism of torque production, back emf, significance of back emf, speed equation, speed control, torque equation. Types of DC motors, characteristics of DC motors, necessity of starter.

AC generators (Alternators) : Introduction, constructional features of salient and non-salient pole type AC generators, working principle, frequency of induced emf, equation for induced emf (expressions for pitch and distribution factor are excluded).

Unit V

Transformers : Principle of operation and construction of single phase transformers (core and shell types), EMF equation, power losses and efficiency, condition for maximum efficiency, load corresponding to maximum efficiency, concept of voltage regulation.

Three Phase Induction Motors : Concept of rotating magnetic field, principle of operation, constructional features, slip, slip speed, frequency of rotor emf, necessity of starter-star delta starter.

Text Books :

1. **S. K. Bhattacharya** - Basic Electrical and Electronics Engineering, Pearson, 2012.
2. **V. N. Mittle and Arvind Mittle** - Basic Electrical Engineering, McGraw Hill Companies, 2nd Edition.
3. **D.P. Khotari and I J. Nagarth** - Basic Electrical Engineering, Tata McGraw Hill Education, 2001.

Course Outcomes:

1. Identify different sources of electrical energy and safety measures (PO1, PO6).
2. Illustrate the construction and working of electrical AC Machines (PO1).
3. Illustrate the construction and working of electrical DC Machines (PO1).
4. Solve problems in magnetic, DC and single phase AC circuits (PO1).
5. Solve problems in balanced three phase AC circuits and demonstrate the measurement of power and energy (PO1).

FUNDAMENTALS OF COMPUTING

Course code : CS101/201

Credits : 2 : 1 : 0 : 0

Course coordinator/s : Mrs. Chandrika C P

Contact hours : 28L+14T

Unit I

Overview and Problem Solving with C : Computing Systems: Hardware and Software, An Engineering problem solving Methodology, Simple C Programs: Program structure, Constants and Variables, Standard Input and Output, Mathematical functions, Character Functions, Operators and Expressions: Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Precedence of Arithmetic Operators, Type conversions in Expressions, operator precedence and associativity.

Unit II

Control Structures in C : Algorithm Development, Decision Making Statements: IF statement, IF - Else Statement, Nesting of IF - Else, the Else IF Ladder, The Switch Statements. The GOTO Statement, **Decision making and Looping**: Introduction, The While Statement, the DO - While statement, the FOR statement, Jumps in loops.

Unit III

Arrays and Matrices : One-Dimensional Array, Sorting Algorithms, Search Algorithms, Two- Dimensional Arrays. **Character Arrays and Strings**: Declaring and Initializing string variables, Reading Strings from Terminal, Writing Strings to screen, Arithmetic Operations on characters, putting strings together, Comparison of two strings, String Handling functions.

Unit IV

Modular Programming with Functions : Programmer Defined Functions, **User Defined Functions**: Category of Functions, Recursion, The scope, visibility and lifetime of variables - Automatic variables, Static Variables, Register Variables, and External Variables, **Structures**: Defining a Structure, Declaring Structure Variables, Accessing Structure Members, Structure Initialization, and Arrays of Structures.

Unit V

Pointers : Understanding pointers, accessing the address of a variable, Declaring Pointer Variables, Initialization of Pointer Variables, Accessing a variable through its pointer. **File :** Introduction to files, Using files in C, Reading data from files, Writing data to files. **An engineering Problem solving Methodology-** Compute the straight-line distance between two points in a plane, Problem Solving Applied: Freezing Temperature of Seawater, Problem Solving Applied: Ozone Measurements, Problem Solving Applied: Tsunami Analysis.

Text Books :

1. **Delores M. Etter** - Engineering Problem Solving with C, 3rd Edition, Pearson Education, 2012.
2. **E. Balagurusamy** - Programming in ANSIC, TMH, 6th Edition, 2012.
3. **Reema Thareja** - Programming in C, 1st Edition, Oxford University press, 2012.

Reference Books :

1. **Behrouz A Forouzan & Richard F Gilberg** - Computer Science: A. Structural Programming Approach using C, Thomas Brooks publication, 2nd Edition, 2006.
2. **Yashvant Kanetkar** - Let Us C, BPB Publications, 10th Edition, 2010.

Course Outcomes :

1. Identify basic elements of computing systems (PO1).
2. Illustrate the use of control structures, decision making and looping statements (PO1, P02).
3. Illustrate the concepts of C as modular programming language which includes functions, pointers and structures (PO1, P02).
4. Implement the concepts of handling arrays. strings and files (PO1, P02).
5. Apply concepts of C for solving simple real world engineering problems (PO2).

FUNDAMENTALS OF COMPUTING AND C-PROGRAMMING LAB

Course code : **CSL101/201**

Credits : **0 : 0 : 1 : 0**

Course coordinator/s : **Mrs. Chandrika C P**

Contact hours : **14P**

1. Basic LINUX Commands, Basic Programming on shell Scripts.
2. Libre office Writer, Spreadsheets (Calc), Databases (Base).
3. Creation of Scientific Documents: Using LaTeX.
4. C-Programming: Using Operators.
5. C-Programming: Using Conditional Statements.
6. C-Programming: Using Switch Case and GOTO Statement.
7. C-Programming: Using Iterative Statements.
8. C-Programming: Using One Dimensional Arrays.
9. C-Programming: Using Two Dimensional Arrays.
10. C-Programming :Using Character array and Strings.
11. C-Programming: Using Functions, Structures, Pointers and Files.
12. C-Programming: Application of C programming to solve simple engineering problems.

Reference Books/Links :

1. **E. Balagurusamy** - Programming in ANSI C, TMH, 6th Edition, 2012.
2. **Reema Thareja** - Programming in C, 1st Edition, Oxford University Press, 2012.
3. **Yashavant Kanetkar** - Let Us C, BPB Publications, 10th Edition, 2010.
4. **Behrouz A Forouzan & Richard F Gilberg** - Computer Science: A Structured Programming Approach using C, Thomas Brooks Publication, 2nd Edition, 2006.
5. <https://www.libreoffice.org/get-help/documentation/>

Course Outcomes :

1. Use basic UNIX commands and Shell Scripting (PO1, PO5).
2. Create Documents, Spreadsheets and Databases using Libre Office tools (PO5, PO10).
3. Construct C-Programs using language construct such as Operators, Conditional and Iterative Statements, concepts such as arrays, functions, strings, structures, pointers and files (PO2, PO5).
4. Develop a C-Program to solve simple engineering problems (PO2, PO5).

PROFESSIONAL COMMUNICATION

Course code : **HSS103/203**

Credits : **2 : 0 : 0 : 0**

Course coordinator/s : **Mrs. Premila Swamy D**

Contact hours : **28L**

Unit I

Basic Communication : Introduction to communication and its process, General and Technical communication, Forms of communication, Levels of communication, Barriers to communication, Nonverbal communication, Cross cultural and gender issues relating to communication, Body language and its importance in communication.

Unit II

Listening : Listening V/s Hearing, Types of Listening, traits of a good listener, importance of listening in communication.

Unit III

Grammar : Parts of speech, usage of tenses, Identifying errors in sentences, words commonly confused and misused, Usage of Phrasal verbs and Idioms, Using right choice of words in a given context.

Unit IV

Writing skills : Paragraph writing, Expansion of ideas.

Unit V

Technical writing : Basics of letter writing, Job application letter, preparing a resume / curriculum vitae, E-mail letters.

Reference Books :

1. **Meenakshi Raman & Sangeetha Sharma** - Technical communication – Principles and Practice, Oxford University Press, 2007.
2. **A.J. Thomson & A. V. Martinet** - A Practical English Grammar, Oxford University Press, 1987.

Course Outcomes :

1. Apply the basic concepts of communication (PO10, PO12).
2. Identify the cross cultural issues in communication (PO9, PO10, PO12).
3. Improvise spoken and written grammatical skills (PO9, PO10, PO12).
4. Develop vocabulary, creative and critical writing skills (PO9, PO10, PO12).
5. Exhibit professional communicative proficiency (PO9, PO10, PO12).

COMPUTER AIDED ENGINEERING DRAWING

Course code : **ME102/202**

Credits : **0 : 1 : 1 : 0**

Course coordinator/s : **Sri S.B. Sridhar**

Contact hours : **14T+14P**

Unit I

CAD Software : Learning the drawing commands such as point, line, arc, circle, ellipse, rectangle, polygons etc. Modify commands such as copy, move, mirror, rotate, pattern, scale etc. Dimensions - linear, aligned, radial, angular etc.

Orthographic projections : Projection of points (I and III Quadrant), Projection of lines.

Projection of Planes : Projection of Planes such as triangle, square, rectangle, pentagon, hexagon and circle.

Unit II

Projection of Solids : Projection of Solids such as cube, prism, pyramid, cylinder, cone and tetrahedron (No problems on freely suspended from corner and drawing profile view when three positions involved).

Unit III

Isometric Projection : Isometric scale, isometric projection of simple solids & their frustums, combination of two solids (Co axial).

Text Books :

1. **K R Gopalakrishna** - Engineering Drawing, Subhas publishers, Bangalore, 32nd Edition, 2012.
2. **N D Bhat & V M Panchal** - Engineering Drawing, Charota Publishing house, Gujarat, 42nd Edition, 2010.

Reference Books :

1. **M H Annaiah & Rajashekar Patil**- Computer aided engineering drawing, New Age International Publishers, 4th Edition, 2010.
2. **R N Hegde & Niranjan Murthy**- Engineering Drawing, Sapna Publications Bangalore 3rd Edition, 2011.
3. A Primer on computer aided Engineering Drawing, Published by VTU, Belgaum, 8th Edition, 2011.

Course Outcomes :

1. Students will be able to demonstrate the usage of a CAD software for creating engineering drawings: commands such as draw, copy, move, mirror, rotate, dimensioning (PO1, PO5, PO9, PO10, PO12).
2. Students will be able to sketch and draw using a CAD software, the orthographic projections of the following with various conditions of position and orientation: points, lines, Planes and Solids (PO1, PO5, PO9, PO10).
3. Students will be able to sketch and draw using a CAD software for Isometric projections of a combination of two coaxial solids (PO1, PO5, PO9, PO10).

ENGINEERING DESIGN

Course code : **AL 101/201**

Credits : **0 : 1 : 1 : 0**

Contact hours : **14T+14P**

This course will provide an introduction to engineering design process. Students will work in a group of 4/5 to solve a problem of current concern requiring an engineering solution. They are required to follow a systematic approach towards developing the solution by considering technical and non-technical factors. The working model of the solution along with the design documentation will be considered for final evaluation.

References:

1. <http://www.saylor.org/site/wp-content/uploads/2012/09/ME101-4.1-Engineering-Design-Process.pdf>
2. <http://ocw.mit.edu/>

Course Outcomes :

1. Define the problem to be solved, in a clear and unambiguous terms.
2. Identify and establish the need to solve the problem by gathering relevant literature .
3. Generate multiple solutions, analyze and select one solution.
4. Test and implement the solution as a team.
5. Document and present the solution to the peer group.

ENGINEERING MATHEMATICS-II

Course code : **MAT201**

Credits : **3 : 1 : 0 : 0**

Course coordinator/s : **Dr. S.H.C.V. Subba Bhatta &**

Contact hours : **42L+14T**

Dr. M.V. Govindaraju

Unit I

Differential Calculus - II: Derivatives of arc length, curvature, radius of curvature. Taylor's theorem and Maclaurin's series (without proof), Indeterminate forms, Taylor's and Maclaurin's theorem for functions of two variables (without proof), maxima and minima of functions of two variables, Lagrange's method of undetermined multipliers.

Unit II

First order and first degree differential equations and its applications : Exact differential equations, Reducible to exact differential equations, application of ODEs to find orthogonal trajectories and to solve simple problems related to engineering applications.

Nonlinear differential equations : Equations solvable for p , equations solvable for y , equations solvable for x , general and singular solutions, Clairaut's equations and equations reducible to Clairaut's form.

Unit III

Linear differential equations of higher order : Linear differential equation of second and higher order with constant co-efficients. Solution of second order linear differential equations using the method of variation of parameters. Cauchy's and Legendre's linear differential equations. Initial and boundary value problems. Engineering applications.

Unit IV

Beta and Gamma Function : Definition, Relation between Beta and Gamma Functions, Problems.

Laplace transforms I : Definition, transforms of elementary functions, properties of Laplace transforms, existence conditions, transform of derivatives, integrals, multiplication by t^n , division by t , evaluation of integrals by Laplace transforms, unit-step function, unit-impulse function.

Unit V

Laplace transforms II : Laplace transforms of Periodic function, Inverse transforms, convolution theorem, solution of linear differential equations and simultaneous linear differential equations using Laplace transforms. Engineering applications.

Text Books :

1. **G.V. Thomas & Finney** – Calculus & Analytical Geometry, Pearson, 12th Edition, 2017.
2. **B.S. Grewal** – Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2015.

Reference Books :

1. **Erwin Kreyszig** – Advanced Engineering Mathematics, Wiley publication, 10th Edition, 2015.
2. **Peter V. O' Neil** – Advanced Engineering Mathematics, Thomson Brooks/Cole, 7th Edition, 2011.
3. **Glyn James** - Advanced Modern Engineering Mathematics, Pearson Education, 4th Edition, 2010.
4. **George B. Thomas, Maurice D. Weir, Joel Hass** – Thomas Calculus, Pearson, 13th Edition, 2014.

Course Outcomes :

1. Apply the knowledge of calculus, multivariate calculus to find arc length, curvature, extreme values, and power Series expansion (PO1, PO2).
2. Learn to solve analytically first order linear and nonlinear differential equations (PO1, PO2).
3. Understand the formation of higher order Linear Differential Equation and its solution. (PO1, PO2).
4. Analyze the importance of transformation of functions through Laplace transforms (PO1, PO2).
5. Illustrates the concept of Laplace Transform to solve initial and boundary value problems (PO1, PO2).

ENGINEERING CHEMISTRY

Course code : **CHY 101/201**

Credits : **3 : 1 : 0 : 0**

Course coordinator/s : **Dr. B. M. Nagabhushana &
Dr. Nagaraju Kottam**

Contact hours : **42L+14T**

Unit I

Electrode potential and chemical cells (EP) : Basic concepts of electrochemistry – electrode potential, origin of single electrode potential, Derivation of Nernst equation, Galvanic cells, Reference electrodes – calomel electrode, Ag-AgCl electrode. Measurement of single electrode potential using saturated calomel electrode. Ion-selective electrode - Glass electrode. Determination of pH using glass electrode. Concentration cells. Numerical problems on electrode potential, EMF of cells and concentration cells.

Batteries (BT) : Basic concepts. Mechanism of battery operation, battery characteristics. Classification of batteries – Primary, secondary and reserve batteries. Modern batteries-construction, working and applications of Zn-air, Nickel-metal hydride, Li-MnO₂ (Lithium batteries).

Unit II

Corrosion science (CR) : Metallic corrosion - Definition, electrochemical theory of corrosion. Types of corrosion - Differential metal corrosion, differential aeration corrosion (Ex: pitting and waterline corrosion) and Stress corrosion. Factors affecting the rate of corrosion. Corrosion control: Metal coating- Anodic and cathodic metal coatings with examples. Inorganic coatings- anodizing and phosphating. Cathodic Protection-sacrificial anode method. Corrosion inhibitors.

Chemistry of nanomaterials (NM) : Introduction to nanomaterials. Synthesis: top-down and bottom-up approaches. Chemical methods of synthesis- solution combustion and sol-gel methods. Characterization techniques like PXRD, SEM, and TEM (only introduction). Applications of nonomaterials.

Unit III

Fuels (FU) : Introduction to fuels, characteristics of good fuel. Calorific value–Definition, net and gross calorific values. Determination of calorific value of a solid fuel by bomb calorimeter. Numerical problems, Liquid fuels: Petroleum cracking - fluidized bed catalytic cracking, Reformation of petrol. Knocking – mechanism, octane number, cetane number, prevention of knocking, unleaded petrol. Bio-diesel and Bio-ethanol - synthesis, advantages and applications. Hydrogen as fuel - Introduction, advantages and applications.

Unit IV

Water Technology (WT) : Hardness – definition, types of hardness and its determination by EDTA method – numerical problems. Determination of dissolved (DO) oxygen by Winklers method. Biological Oxygen Demand (BOD)–definition, determination and numerical problems. Chemical Oxygen Demand (COD) – Definition, determination and numerical problems. Determination of nitrate using phenol disulphonic acid (spectrophotometric method) and sulphate by gravimetric method. Sewage treatment – Primary treatment, Secondary treatment by activated sludge method and tertiary treatment. Potable water – Definition, membrane based Technology for water purification, example: purification of water by reverse osmosis. Purification of water by ion exchange method.

Unit V

High Polymers (HP) : Chemistry of polymeric materials: Polymerization, methods of polymerization - bulk, solution, suspension and emulsion polymerization. Glass transition temperature (T_g), factors influencing T_g. Structure and properties relationship. Molecular weight of polymers – Number average and weight average molecular weights and problems. Synthesis, properties and applications of Teflon and PMMA. Adhesives – Definition, examples Manufacture and applications of epoxy resins. Biopolymers- Introduction, advantages and examples. Conducting polymers - Definition, mechanism of conduction in polyacetylene, structure and applications of polyaniline. Polymer composites-definition, constituents. Example-carbon fiber reinforced polymer composites and their properties and uses.

Text Books :

1. **P. C. Jain and Monica Jain** - A text Book of Engineering Chemistry, Dhanapat Rai Publications, New Delhi, 12th Edition, 2012.
2. **R.V. Gadag and Nithyananda Shetty** - A text Book of Engineering Chemistry. I.K International publishing house, 3rd Edition, 2014.

Reference Books :

1. **F.W. Billmeyer** - Text Book of Polymer Science, John Wiley & Sons, 4th Edition, 1996.
2. **M.G. Fontana, N. D. Greene** - Corrosion Engineering, McGraw Hill Publications, New York, 3rd Edition, 1996.
3. **B.R.Puri, L.R. Sharma & M.S. Pathania**, - Principles of Physical Chemistry, S. Nagin Chand & Co., 41st Edition., 2004.
4. **G.A.Ozin and A.C. Arsenault** - Nanochemistry: A Chemical approach to Nanomaterials, RSC Publishing, 2005.

Course Outcomes :

1. Apply the knowledge of electrochemistry to improve the efficiency of batteries (PO1, PO2).
2. Interpret the reasons of corrosion, monitor and control by using the proper techniques (PO1, PO2).
3. Apply different conventional & renewable sources of energy to generate power. Have concept on bearing high octane quality fuels (PO1, PO2).
4. Analyze the water samples and will have the knowledge to obtain potable water using different techniques and recycling of water (PO1, PO2, PO3).
5. Apply the knowledge in synthesis of advanced polymers, composites and conducting polymers for different applications (PO1, PO2).

ENGINEERING CHEMISTRY LAB

Course code : **CHYL 101/201**

Credits : **0 : 0 : 1 : 0**

Course coordinator/s : **Dr. B. M. Nagabhushana &**

Contact hours : **14P**

Dr. Nagaraju Kottam

1. Assessment of suitability of drinking and industrial water by estimation of hardness.
2. Determination of COD of waste water sample.
3. Design and execute an experiment for finding out iron content in rust.
4. Determination of % Cu in brass by iodometric method.
5. Colorimetric estimation of metal ions (Copper) in effluent water.
6. Estimation of sodium present in water sample by Flamephotometry.
7. Determination of amount of HCl and CH₃COOH present in a mixture by conductometry.
8. Estimation of FAS present in the given FAS solution potentiometrically.
9. Determination of pK_a value of the given weak acid.
10. Determination of single electrode potential using secondary reference electrode (Verification of Nernst equation).
11. Synthesis of nanomaterials by combustion method.
12. Determination of chloride by Mohr's method.

Reference Books :

1. **Arthur I. Vogel's** - quantitative Inorganic analysis including elementary instrumental analysis, ELBS, Longmann group, 6th Edition, 2008.
2. **Clair N. Sawyer and Perry L, Mc. Carty** - Chemistry for Environmental Engineering, 3rd Edition, Mc. Graw- Hill Book Company, New York, 1994.
3. Chemistry Manual – MSRIT 2017-18.

Course Outcomes :

1. Analyze handling apparatus in chemical laboratories for analysis of various materials. (PO1,PO2).
2. Analyze the suitability of water for domestic and industrial consumption. (PO1,PO2, PO3).
3. Evaluate the content and composition of new materials encountered in engineering applications. (PO1,PO2).
4. Enumerate various sophisticated instruments in professional and research activities. (PO1,PO2).
5. Apply the knowledge of electrochemistry to improve the efficiency of batteries. (PO1,PO2).

ELEMENTS OF MECHANICAL ENGINEERING

Course code : **ME101/201**

Credits : **4 : 0 : 0 : 0**

Course coordinator/s : **Dr. T Anil Kumar**

Contact hours : **56L**

Unit I

Energy resources : Conventional Fossil fuels, Hydropower, Nuclear Power. Non-conventional : Solar, Wind, Geothermal, Tidal and Ocean thermal energy. Steam Boilers: Formation of steam at constant pressure, Conditions of steam, Properties of steam with simple numerical problems. Boilers, Boiler mountings, Accessories and Applications. Steam Turbine : Prime movers, Impulse and Reaction turbine, Definitions of compounding, methods of compounding, Gas Turbine: Classification, Working principles and operations, Open and closed cycle Gas Turbines. Water Turbines: Classification, Working principle of Pelton, Francis and Kaplan Turbines.

Unit II

Internal Combustion Engines : Classification, Parts of an I C Engine, 2 stroke, 4 stroke, Petrol and Diesel Engines, Simple numerical problems on Indicated power, Indicated Thermal Efficiency, Brake Power, Brake Thermal Efficiency, Mechanical Efficiency, Specific fuel consumption. **Refrigeration and air conditioning**: Classification of Refrigeration, working principles of Vapor Compression and Vapour Absorption Refrigerator, Properties of Refrigerant. Psychrometry, working principle of window air conditioner, Central air conditioning system.

Unit III

Metal Removal Processes : Machine Tools, Specifications of Lathe, Parts of Engine Lathe, Working principle, Lathe operations; Plain Turning, Facing, Parting, Grooving, Knurling, Taper turning and thread cutting. Drilling Machine: Working principles of Bench and Radial Drilling Machines, Drilling operations; Drilling, Reaming, Boring, Counter Sinking, Counter Boring, Spot Facing. Milling Machines : Methods of Milling, Milling Machines : Horizontal and Vertical Milling Operations : Plain, Angular, Slot, Form, Straddle, Gang, Face and End Milling. Grinding Machine: Grinding, Grinding wheel, Dressing and Truing, Surface, Cylindrical and Centre less Grinding Machine.

Unit IV

Computer Numerical Control Machines : Numerical control, Computer numerical control, Axis, Co-ordinate system, Types of slide control and control system.

Metal Joining Process : Welding, Soldering and Brazing, Oxyacetylene welding, Arc welding Electrodes, Soldering and Brazing .

Bearings : Classifications, Journal Bearing, Bushed, Pedestal, Thrust Bearings, Foot-step, Collar. Antifriction Bearings - Ball and Roller.

Unit V

Power Transmission : Belt Drives - Types, Velocity Ratio, Slip, Length of Belts for Open Belt and Cross Belt drive, Angle of lap, ratio of belt Tensions, Power Transmitted, Creep in Belt drive, Pulleys : Stepped, Tight and Loose, Idler, Simple numerical problems, V-belt drive. Gear drives: Classification of Gears, Spur Gear nomenclature, Velocity Ratio, Pinion and Rake, Helical Gears, Bevel Gears and Worm Gears. Gear train: Train values, Classification of Gear Trains and their uses, Simple numerical problems on simple, Compound and reverted Gear Trains.

Additive Manufacturing : Introduction, classification of Rapid Prototyping Process, types of Rapid Prototyping Process (SLA, FDM and LOM), advantages, disadvantages, applications.

Text Books :

1. **Dr. A.S.Ravindra** - Elements of Mechanical Engineering, Cenegal learning, Technological university series, 8th Edition, 2011.
2. **Roy, SKH Choudhury and AKH Choudhury** - Elements of Mechanical Engineering, Media promoters and publishers, Volume I & II, 11th Edition, 2001.
3. **Kestoor Praveen and Dr.M R Ramesh** - Elements of Mechanical Engineering, Suggi publication, 1st Edition, 2012.

Reference Books :

1. **R.K.Rajput** - Thermal Engineering, Laxmi Publications Pvt Ltd, 3rd Edition, 2007.
2. **R.S. Khurmi & K Gupta** - Theory of Machines, S Chand & Company Ltd, New Delhi, 1st Edition, 2007.
3. **Serope Kalpakjian and Steven R Schmid** - Manufacturing Processes for Engineering materials, Pearson education, 4th Edition 2007.
4. **Pravin Kumar** - Basic Mechanical Engineering, Pearson Publication 1st Edition, 2013.
5. **Kenneth G. Cooper** – Rapid Prototyping Technology, Marcel Dekker Inc., 2013.

Course Outcomes :

1. Recognize various available energy sources and its utilization using boilers and prime movers for various power plants and other applications (PO1,PO2,PO7).
2. Illustrate the construction and working of I C Engines, Refrigeration and Air-conditioning systems required for transportation, domestic and industrial purpose (PO1,PO2,PO7).
3. Identify various machining process, joining and other manufacturing techniques used for production of various components (PO1,PO2).
4. Differentiate the bearings and power transmission systems used in various applications (PO1, PO2).
5. Identify the significance of mechanical engineering concepts in various fields of engineering applications (PO1,PO2,PO4,PO12).

BASIC ELECTRONICS

Course code : **EC101/201**

Credits : **4 : 0 : 0 : 0**

Course coordinator/s : **Mrs. Jayashree S**

Contact hours : **56L**

Unit I

Semiconductor Diodes and Applications : P-N Junction diode, Characteristics and Parameters, Diode Approximations, DC load line analysis, Half-Wave Rectifier, Two-Diode Full Wave Rectifier, Bridge Rectifier, Capacitor filter circuit, Zener diode as Voltage Regulators, Shunt diode Clipping Circuits, Clamping Circuits: Negative and Positive Clamping Circuits, Numerical examples as applicable.

Bipolar Junction Transistors : BJT Operation, BJT Voltages and Currents, BJT Amplification, Common Base, Common Emitter and Common Collector Characteristics, Numerical examples as applicable.

Unit II

BJT Biasing : DC load line and Bias Point, Base Bias, Voltage Divider Bias, Numerical examples as applicable.

Introduction to Operational Amplifiers: Ideal OP-AMP, Inverting and Non Inverting OPAMP circuits, OPAMP applications: Voltage Follower, Addition, Subtraction, Integration, Differentiation. Numerical examples as applicable.

Unit III

Digital Electronics : Introduction. Switching and Logic Levels. Digital Waveform. Number Systems: Decimal Number System, Binary Number System, Converting Decimal to Binary, Hexadecimal Number System: Converting Binary to Hexadecimal, Hexadecimal to Binary, Converting Hexadecimal to Decimal, Converting Decimal to Hexadecimal, Octal Numbers: Binary to Octal Conversion. Complement of Binary Numbers with numerals. Boolean Algebra Theorems, De Morgan's theorem. **Digital Circuits**: Logic gates, NOT Gate, AND Gate, OR Gate, XOR Gate, NAND Gate, NOR Gate, X-NOR Gate. Algebraic Simplification, NAND and NOR Implementation: NAND Implementation, NOR Implementation. Half adder, Full adder.

Unit IV

Flip Flops : Introduction to Flip-Flops, NAND Gate Latch/ NOR Gate Latch, RS Flip-Flop, Gated Flip-Flops: Clocked RS Flip-Flop.

Microcontrollers : Introduction to Microcontrollers, 8051 Microcontroller Architecture and Working.

Unit V

Communication Systems : Introduction, Elements of Communication Systems, Modulation: Amplitude Modulation, Spectrum Power, AM Detection (Demodulation), Frequency and Phase Modulation. Amplitude and Frequency Modulation: A comparison.

Transducers : Introduction, Passive Electrical Transducers, Resistive Transducers, Resistance Thermometers, Thermistor. Linear Variable Differential Transformer (LVDT). Active Electrical Transducers, Piezoelectric Transducer, Photoelectric Transducer.

Text Books :

1. **David .A. Bell** - Electronic Devices and Circuits, Oxford University Press, 5th Edition, 2008.
2. **D. P. Kothari, I. J. Nagrath** - Basic Electronics, McGraw Hill Education (India) Private Limited, 2014.

Reference Books :

1. **Kenneth J. Ayala** - The 8051 Microcontroller, West publishing company, 3rd Edition, 2004.

Course Outcomes :

1. Describe the various applications of electronic devices (PO1).
2. Analyze the various applications of Op-amps (PO1, PO2).
3. Compile the different building blocks in digital electronics using various logic gates (PO1, PO3).
4. Appreciate the Microcontroller architecture (PO1).
5. Describe the model of communication systems (PO1, PO2).

CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS

Course code : **HSS 101/201**

Credits : **2 : 0 : 0 : 0**

Course coordinator/s : **Mrs. Premila Swamy &**

Contact hours : **28L**

Mrs. Kanya Kumari. S

Unit I

Evolution and salient features of Indian constitution. The Preamble, Fundamental Rights in details and exercise of rights under Part III, Limitations & relevant cases.

Unit II

Relevance of Directive Principles of State Policy under part-IV, Fundamental Duties & their significance. Special constitutional provisions for SC&ST, Women & Children. Human rights –meaning and definitions, legislation specific themes in Human rights – working of national Human rights commission in India.

Unit III

Union executive - President, Prime Minister, Parliament & Supreme court of India. State executive Governor, Chief Minister, State legislatures & High courts.

Unit IV

Emergency provisions, Electoral process, Amendment procedure and Major Constitutional amendments. 42nd, 44th, 74th, 76th, 86th and, 91st amendments.

Unit V

Scope and Aim of Engineering Ethics, Responsibility of engineers, Impediments to Responsibility, Honesty, Integrity, Reliability, Risks, Safety and liability of Engineering.

Text Books :

1. A Primer on Constitution of India & Professional ethics, VTU Publication, 1st Edition, 2007.
2. **Charles E Harries, Michel. S Pritchard** - Engineering Ethics.

Reference Books :

1. **Durga Das Basu** - Introduction to Constitution of India, 19th/20th Edition, 2001.
2. **M.V. Pylee** - An Introduction to Constitution of India, 4th Edition, 2002.
3. **K.R.Phaneesh** - Constitution of India & Professional ethics, 9th Edition, 2014.
4. **M. Govind Rajan** - Engineering Ethics, 4th Edition, 2004.

Course Outcomes :

1. Identify the fundamental principles of Indian constitution (PO12).
2. Examine various provisions of the fundamental duties and directives of government (PO12).
3. Understand about basic Human rights in India (PO6, PO12).
4. Identify the role of government (PO12).
5. Make ethical and moral analysis during decision making situations and inculcate ethical behavior as a trait in professional development (PO8).

ENVIRONMENTAL STUDIES

Course code : **HSS 102/202**

Credits : **2 : 0 : 0 : 0**

Course coordinator/s : **Smt. Swathi T.S**

Contact hours : **28L**

Unit I

Environment, Ecology, Biodiversity : Definition, Scope and importance, Multidisciplinary nature of Environmental studies, Concept of an ecosystem, Biotic and Abiotic component of an ecosystem and its interaction, Food chain and food web, Energy flow and material cycling in ecosystem, Balanced eco system, Biodiversity- Ecological Value of biodiversity, Threats to biodiversity and Conservation of Biodiversity, Concept of Sustainable Development: Definition, objectives and applications.

Unit II

Natural resources : Forest resources : Ecological Importance of forest, Deforestation- Causes and remedies, Water resources: Global water resources distribution. Mineral resources: Environmental effects of extracting and processing Mineral resources. Food resources: Effects of modern agriculture, Fertilizer-pesticide problems, Water logging and Salinity. Land resources: Land as a resource, Man induced landslides, Soil erosion and desertification.

Unit III

Energy sources : Growing energy needs. Conventional and non conventional / Renewable and non renewable energy sources. Environmental effects of fossil fuel use. Alternative to fossil fuels: Different clean renewable energy resources with their merits and demerits. Bio energy-Ethanol and Biomass energy. Energy of the future- hydrogen fuel cells and nuclear fusion. Environmental impact assessment(EIA): Definition, Objectives and benefits, step by step procedure of EIA.

Unit IV

Environmental Pollution : Definition, Causes, Effects and control measures of Water pollution, Air pollution and Soil/Land pollution, Management of municipal solid wastes. Dams-benefits and problems. Effects of Housing, industry and infrastructure on environment.

Unit V

Environmental Protection : Global Warming and Climate change, Acid Rain, Ozone Layer Depletion. Salient features of Environmental Protection Act, Air & Water Acts. Functions of Central and state Pollution Control Boards. Environmental Management-ISO 14000.

Text Books :

1. **Dr. S. M. Prakash** - Environmental Studies, Elite Publishers, 2007.
2. **Meenakshi** - Environmental science and engineering, Prentice Hall of India, 1st Edition, 2005.
3. **Benny Joseph** - Environmental Studies, Tata Mc-GrawHill, 1st Edition, 2005.
4. **Dr. D. L. Manjunath** - Environmental Studies, Pearson education, 3rd Edition, 2009.

Reference Books :

1. **P. Venugopala Rao** - Principles of Environmental Science & Engineering, Prentice Hall of India, 1st Edition, 2006.
2. **Suresh K. Dhameja** - Environmental Engineering and Management, S.K. Kataria & Sons.

Course Outcomes :

1. Describe the importance of environmental studies, sustainable development and biodiversity (PO1, PO7).
2. Explain the importance and conservation of impacts of natural resources (PO1, PO7).
3. Distinguish the energy sources and identify the alternative energy sources for sustainable development (PO1, PO7).
4. Identify the causes, effects and control measures of pollution in developmental activities (PO1, PO7).
5. Outline the current environmental issues and the role of the agencies for environmental protection (PO1, PO7).

KANNADA MANASU

Course code : HSS104 / 204M

Credits : 0 : 0 : 0 : 0

Course coordinator/s : Mrs. Kanya Kumari S

Contact hours : 28L

ಘಟಕ - 1

ವ್ಯಕ್ತಿ ಚಿತ್ರ, ಪ್ರವಾಸ ಕಥನ, ವಿಜ್ಞಾನ ಲೇಖನ, ವಿನೋದ, ಪರಿಚಯ ಲೇಖನ, ಕತೆ.

ಘಟಕ - 2

ಪ್ರಬಂಧ ವಿಭಾಗ : ಅಣ್ಣಪ್ಪನ ರೇಷ್ಮೆ ಕಾಯಿಲೆ - ಕುವೆಂಪು ಇತರೆ ಪ್ರಬಂಧಗಳನ್ನು ಕುರಿತು ಪರಿಚಯ.

ಘಟಕ - 3

ಕವನ: ಬೆಳ್ಳಿಯ ಹಾಡು - ಡಾ. ಸಿದ್ದಲಿಂಗಯ್ಯ ದಲಿತ ಸಾಹಿತ್ಯ ಕುರಿತು ವಿವರಣೆ.

ಘಟಕ - 4

ತಂತ್ರಜ್ಞಾನ ಬರಹ - ವೃತ್ತಿ ಶಿಕ್ಷಣದಲ್ಲಿ ಕನ್ನಡ ಮಾಧ್ಯಮ -ಎಸ್. ಸುಂದರ್ ಲೇಖನಗಳನ್ನು ಕುರಿತು ವಿವರಣೆ.

ಘಟಕ - 5

ಜನಪದ ಕಾವ್ಯ - ಕೋವೇ ಗೌಡ.

ವಿಜ್ಞಾನ ಲೇಖನ - ಅನೇಹಳ್ಳದಲ್ಲಿ ಹುಡುಗಿಯರು - ಬಿ.ಜಿ.ಎಲ್. ಸ್ವಾಮಿ.

ಪಠ್ಯ ಪುಸ್ತಕ :

ಕನ್ನಡ ಮನಸು, ಪ್ರಸಾರಾಂಗ, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಂಪಿ, 2015.

ಪೂರಕ ಪಠ್ಯಗಳು :

- 1) ಎಂ.ಹೆಚ್. ಕೃಷ್ಣಯ್ಯ - ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ.
- 2) ರಾಜಪ್ಪ ದಳವಾಯಿ - ಕನ್ನಡ ಸಾಹಿತ್ಯ ಕೋಶ.

ಓದಿನ ಉಪಯೋಗ (Course Outcomes) :

1. ಕನ್ನಡ ಸಾಹಿತ್ಯದಲ್ಲಿ ಅಸಕ್ತ ಬೆಳೆಯುತ್ತದೆ. (PO12).
2. ಭಾಷಾ ಗೌರವ, ಬಾಷೆಯ ಅರಿವು, ಉತ್ತಮ ಚಿಂತನೆ ಹಾಗೂ -ಕಥೆ, ಕವನ, ಕಾದಂಬರಿ ಪ್ರಬಂಧ ಹೊಸ.

ಪ್ರಕಾರಗಳನ್ನು ಓದುವ ಹವ್ಯಾಸ ಬೆಳೆಯುತ್ತದೆ (PO6, PO12).

KANNADA KALI

Course code : HSS104/204 K

Credits : 0 : 0 : 0 : 0

Course coordinator/s : Mrs. Kanya Kumari. S

Contact hours : 28L

Unit I

Introducing each other, Personal pronouns, Possessive forms, and Interrogative words. Introducing each other, noun, verb.

Unit II

About Ramayana. Adjective, usage of tenses, formation of words and sentences. Enquiring about college. Qualitative and quantitative adjectives.

Unit III

Enquiring about room. Preposition (locative case). Vegetable Market. alphabet, basic numerals.

Unit IV

About medical college, Ordinal numerals, plural forms. In a cloth shop, Color adjectives, defective verbs Translation.

Unit V

Plan to go for picnic, Names of the days, Kannada scripts, and digits and passage to write. Numerical, Vocabulary. Enquiring about friends and family, dialogue writing and paragraph writing.

Reference Book / Text Book :

1. **Lingadevaru Halemane** - Kannada Kali, 3rd Edition, 2015.
2. Kannada Kali, Prasaranga, Kannada University, Hampi.

Course Outcomes :

1. Develop vocabulary (PO10).
2. Enrich their language skill for various purposes (PO6, PO12).

WORKSHOP PRACTICE

Course code : **MEL103/203**

Credits : **0 : 1 : 1 : 0**

Course coordinator/s : **Mr. Arun Kumar. P.C**

Contact hours : **14T+14P**

Part-A

Metal removal with Turning Machine : Study of an Engine Lathe and its parts: 4 models on Lathe Operations containing-Turning, Step Turning, Taper Turning and Knurling;

Fitting: Study of Fitting Tools, Fitting operations and joints: Minimum of 4 models involving Rectangular, Triangular, Semicircular and Dovetail joints.

Part-B

Welding : Study of electric arc welding tools and equipments: Minimum 4 models on electric arc welding of butt joint, lap joint, T-joint and L-joint;

Sheet Metal and Soldering : Study of sheet metal and soldering tools: Minimum 4 models- Development and soldering of simple cylinder (both end open), Rectangular Square prism, a simple tray and conical frustum.

Text Book :

1. Work shop manual prepared by the Department of Mechanical Engineering, MSRIT.

Reference Books :

1. **S.K.H. Choudhury - A.K.H. Choudhury, Nirjhar Roy** - The Elements of Workshop Technology, Volume I & II, Media promoters and publishers, Mumbai, 11th Edition, 2001.
2. **James Anderson, Earle E Jatro** - Shop Theory, Tata McGraw Hill Publications, 2nd Edition, 2005.

Course Outcomes :

1. Illustrate the usage of different materials and hand tools in workshops and develop simple turning metallic models using lathe by learning the basic operations of lathe (PO1, PO2, PO3, PO5, PO12).
2. Develop sample of fitting and sheet metal work by learning their basics of the practical work involved (PO1, PO2, PO3, PO12).
3. Create simple welding and soldering models (PO1, PO3, PO5, PO12).