

**FIRST SEMESTER B E PROGRAM SCHEME FOR 2019-2020**

**Electrical Science Stream**

**This stream comprises of Departments of Electrical Engg / Electronics & communication Engg /Computer Science and Engg.**

No	Code	Course	Category	L-T-P	Credits	Contact Hours	CIE	SEE	Total	Exam Duration
1	18EMAB101	Single Variable Calculus	BS	4-1-0	5	6	50	50	100	3 hrs
2	15EPHB101	Engineering Physics	BS	3-0-0	3	3	50	50	100	3 hrs
3	15ECVF101	Engineering Mechanics	ES	4-0-0	4	4	50	50	100	3 hrs
4	18ECSP101	C Programming for Problem solving	ES	0-0-3	3	6	80	20	100	3 hrs
5	18EEEF101	Basic Electrical Engineering	ES	3-0-0	3	3	50	50	100	3 hrs
6	15EHSP101	Social Innovation	HSS	0-1-1	2	3	80	20	100	3 hrs
7	16EPHP101	Engineering Physics Lab	BS	0-0-1	1	2	80	20	100	3 hrs
Total				14-2-5	21	27				

**Mechanical Science Stream**

**This stream comprises of Departments of Mechanical Engg / Civil Engg / Bo Technology / Automation and Robotics**

No	Code	Course	Category	L-T-P	Credits	Contact Hours	CIE	SEE	Total	Exam Duration
1	18EMAB101	Single Variable Calculus	BS	4-1-0	5	6	50	50	100	3 hours
2	15ECHB101	Engineering Chemistry	BS	3-0-0	3	3	50	50	100	3 hours
3	18ECSP101	C Programming for Problem solving	ES	0-0-3	3	6	80	20	100	3 hours
4	15ECRP101	Engineering Exploration	ES	0-0-3	3	6	80	20	100	3 hours
5	18EECF102	Basic Electronics	ES	4-0-0	4	4	50	50	100	3 hours
6	15EMEF101	Basic Mechanical Engg.	ES	2-1-0	3	4	50	50	100	3 hours
7	15EHSH101	Professional Communication	HSS	1-1-0	2	3	50	50	100	3 hours
Total				15-2-6	23	32				



**FIRST SEMESTER B E PROGRAM 2019-20**  
**Electrical Science Stream Syllabi Content**

<b>Program: UG</b>		
<b>Course Title: Single Variable Calculus</b>		<b>Course Code: 18EMAB101</b>
<b>L-T-P: 4-1-0</b>	<b>Credits: 05</b>	<b>Contact Hours: 50</b>
<b>CIE Marks: 50</b>	<b>SEE Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching Hours: 04</b>	<b>Examination Duration: 3hrs</b>	
<b>Unit I</b>		
<b>1. Functions, Graphs and Models</b>		<b>07 hours</b>
Functions, types of functions, transformations and models (Linear, exponential, trigonometric).		
<b>MATLAB:</b> Graphing functions, Domain-Range and Interpreting the models		
<b>2. Calculus of functions and models</b>		<b>13 hours</b>
Limit of a function, Infinite limits- graph, Continuity and discontinuity, Intermediate value theorem statement, Roots of the equation using Bisection Method and Newton- Raphson Method		
Interpretation of derivative as a rate of change, All the rules of derivatives (List only), Maxima, Minima and optimization problems. Curvature and Radius of Curvature, Indeterminate forms, L- Hospital's rule-Examples		
<b>MATLAB:</b> optimization problems. Curvature problems		
<b>Unit II</b>		
<b>3. Infinite Series</b>		<b>06 hours</b>
Definition, Convergence of series, Tests of convergence – p-series, Alternating series. Power series, radius of convergence, Taylor's and Maclaurin's series, Applications of Taylor's and Maclaurin's series		
<b>MATLAB:</b> Convergence of series		
<b>4. Integral calculus</b>		<b>14 hours</b>
Tracing of standard curves in Cartesian form ,Parametric form and Polar form; Beta and gamma function, relation between them, evaluation of integrals using Beta and gamma functions; Applications to find arc length, Area, Volume and surface area (Cartesian, parametric and polar curves). Approximate integration- Trapezoidal rule, Simpson's 1/3 rule		
<b>MATLAB:</b> problems on arc length, area, volume and surface area		
<b>Unit III</b>		

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**5. Ordinary differential equations of first order**

**10 hours**

(a) Introduction to Initial Value problems. Linear and Bernoulli's equations, Exact equations and reducible to exact form, Numerical solution to Initial Value problems-Euler's method, Modified Euler's method and Runge-Kutta method

(b) Applications of first order differential equations-Orthogonal trajectories growth and decay problems, mixture problems, Electrical circuits, falling bodies.

**MATLAB:** Solve differential equations

**Text Books**

1. Early Transcendentals Calculus- James Stewart, Thomson Books, 7ed 2010.

**Reference Books:**

1. Calculus Single and Multivariable, Hughes-Hallett Gleason, Wiley India Ed, 4ed, 2009.
2. Thomas Calculus, George B Thomas, Pearson India, 12ed, 2010



**FIRST SEMESTER B E PROGRAM 2019-20**  
**Electrical Science Stream Syllabi Content**

<b>Program : UG</b>		
<b>Course Code: 15EPHB101</b>	<b>Course Title: <b>Engineering Physics</b></b>	
<b>L-T-P-SS: 3-0-0-0</b>	<b>Credits:3</b>	<b>Contact Hrs: 40</b>
<b>CIE Marks: 50</b>	<b>SEE Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching Hrs 3 Hrs</b>	<b>Exam Duration</b>	<b>3 Hrs</b>
<b>Unit I</b>		
<b>No</b>	<b>Content</b>	<b>Hrs</b>
<b>1</b>	<p><b>Chapter 1: Conduction in semiconductors</b>  <b>Atomic theory:</b> The atom, electron orbits and energy levels, energy bands,  <b>Conduction in solids:</b> Electron motion and hole transfer, conventional current and electron flow  <b>Conductors, semiconductors and insulators:</b> Bonding force between atoms, Energy bands in different materials.  <b>n-type and p-type Semiconductors:</b> Doping, n-Type material, p-Type material, Majority and minority charge carriers, Effects of heat and light, charge carrier density.  <b>Semiconductor conductivity:</b> Drift current, diffusion current, charge carrier velocity, conductivity, Hall Effect.                      (Text 1 Page No 1-33)</p>	<b>05 Hours</b>
<b>2</b>	<p><b>Chapter 2: Junctions</b>  <b>The pn-Junctions:</b> Junction of p-Type and n-Type, Barrier voltage, depletion region, Qualitative theory of p-n Junction  <b>Biased junctions:</b> Reverse biased junction, forward biased junction, junction temperature effects.  <b>Junction currents and voltages:</b> Shockley equation, junction currents, junction voltages.  <b>p-n Junction Diode characteristics and parameters:</b> Forward and reverse characteristics, diode parameters.  <b>Diode approximations:</b> Ideal diode and practical diodes, piecewise linear characteristics, DC equivalent circuits.  <b>DC load line analysis:</b> DC load line, Q-Point, calculating load resistance and supply</p>	<b>10 Hours</b>

	<p>voltage.</p> <p><b>Temperature Effects:</b> Diode power dissipation, forward voltage drop, dynamic resistance.</p> <p><b>Diode AC models:</b> Junction capacitance, AC-equivalent circuits (Reverse biased and forward biased), reverse recovery time.</p> <p><b>Diode specifications:</b> Diode data sheets, low power diodes, rectifier diodes</p> <p><b>Diode testing:</b> Ohmmeter tests, use of digital meter, plotting diode characteristics.</p> <p><b>Zener diodes:</b> Junction break down, circuit symbols and packages, characteristics and parameters, data sheet, equivalent circuits.</p> <p>(Text 1 Page No 34-71)</p>	
<b>Unit II</b>		
<b>3</b>	<p><b>Chapter 3: Electrostatics</b></p> <p><b>Review on vectors:</b> Coordinate Systems, Vector and Scalar Quantities, Properties of Vectors, Components of a Vector and Unit Vectors (Text 2 Page No 59-77)</p> <p><b>Electric Fields:</b> Properties of Electric Charges, Charging Objects by Induction, Coulomb's Law, Analysis Model: Particle in a Field (Electric), Electric Field of a Continuous Charge Distribution, Electric Field Lines Motion of a Charged Particle in a Uniform Electric Field</p> <p><b>Gauss's Law:</b> Electric Flux, Gauss's Law, Application of Gauss's Law to Various Charge Distributions, Conductors in Electrostatic Equilibrium</p> <p><b>Electric Potential:</b> Electric Potential and Potential Difference, Potential Difference in a Uniform Electric Field, Electric Potential and Potential Energy Due to Point Charges, Obtaining the Value of the Electric Field from the Electric Potential, Electric Potential Due to Continuous Charge Distributions Electric Potential Due to a Charged Conductor, Applications of Electrostatics</p> <p><b>Capacitance and Dielectrics:</b> Definition of Capacitance, Calculating Capacitance, Combinations of Capacitors, Energy Stored in a Charged Capacitor, Capacitors with Dielectrics, Electric Dipole in an Electric Field, An Atomic Description of Dielectrics (Text 2 Page No 690-807)</p>	<b>15 Hours</b>
<b>Unit – III</b>		
<b>4</b>	<p><b>Chapter 4: Electromagnetics</b></p> <p><b>Magnetic Fields:</b> Analysis Model: Particle in a Field (Magnetic), Motion of a Charged Particle in a Uniform Magnetic Field, Applications Involving Charged Particles Moving in a Magnetic Field, Magnetic Force Acting on a Current-Carrying Conductor, Torque on</p>	<b>10 Hours</b>



<p>a Current Loop in a Uniform Magnetic Field, <b>Sources of the Magnetic Field:</b> The Biot–Savart Law, The Magnetic Force Between Two Parallel Conductors, Ampere’s Law, The Magnetic Field of a Solenoid, Gauss’s Law in Magnetism, Magnetism in Matter <b>Faraday’s Law:</b> Faraday’s Law of Induction, Motional emf, Lenz’s Law, Induced emf and Electric Fields Generators and Motors, Eddy Currents (Text 2 Page No 868-969)</p>	
<p><b>Text Book:</b></p> <ol style="list-style-type: none"><li>1. David A Bell, “Electronics Devices and Circuits”, Fifth Edition, Oxford University Press.</li><li>2. Serway and Jewett, “Physics for Scientists and Engineers-with Modern Physics”, 9<sup>th</sup> Edition, CENGAGE learning. 2014</li></ol> <p><b>References:</b></p> <ol style="list-style-type: none"><li>1. Jacob Millman and Christos Halkias, “Electronic Devices and Circuits” TMH</li><li>2. R P Feynman, Robert B Leighton , Matthew Sands, The Feynman Lectures on Physics Vol-II, Norosa Publishing House (1998).</li><li>3. Ben G Streetman, Solid State Electronic Devices, Prentice Hall, 1995</li></ol>	



**FIRST SEMESTER B E PROGRAM 2019-20**  
**Electrical Science Stream Syllabi Content**

<b>Program: UG</b>		
<b>Course Code: 15ECVF101</b>	<b>Course Title: <b>Engineering Mechanics</b></b>	
<b>L-T-P-SS: 4-0-0-0</b>	<b>Credits:4</b>	<b>Contact Hrs: 50</b>
<b>CIE Marks: 50</b>	<b>SEE Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching Hrs: 4</b>		<b>Exam Duration: 3 hours</b>
Unit I		
<b>No</b>	<b>Content</b>	<b>Hrs</b>
<b>1</b>	<p><b>Chapter 1: Overview of Civil Engineering</b>  <b>Evolution of Civil Engineering</b>  Specialization, scope and role.  1 hr</p> <p><b>Impact of Civil Engineering on</b>  National economy, environment and social &amp; cultural fabric.  2 hr</p> <p><b>Challenges and Opportunities for Civil Engineers</b>  Civil Engineering Marvels, Future challenges, Higher education and Research.  1 hr</p>	04
<b>2</b>	<p><b>Chapter 2: Coplanar concurrent force system</b>  <b>Introduction to Engineering Mechanics:</b>  Basic idealizations – Particle, Continuum, Body, Rigid body, Deformable body, Definition of force and its elements; Laws of Mechanics – Parallelogram law of forces, Principle of transmissibility, Law of Superposition, Newton’s laws of motion. Classification of force systems 3 hrs</p> <p><b>Resultant of coplanar concurrent force system:</b> Definitions – Resultant, composition &amp; Resolution of a force, Equilibrium, Equilibrant, Formulae for resultant of forces and resolution of a force. Numerical problems on resultant of forces. 4 hrs</p> <p><b>Equilibrium of coplanar concurrent force system:</b>  Conditions of equilibrium, Action &amp; Reaction, Free body diagram, Lamis’ theorem. Numerical problems on equilibrium of forces. 5 hrs</p>	12



3	<b>Chapter 3: Coplanar non-concurrent force system</b> <b>Resultant of a force system:</b> Moment, moment of a force, couple, moment of a couple, Characteristics of couple, Equivalent force-couple system, Numerical problems on moment of forces and couples, on equivalent force-couple system. Varignons principle of moments, Resultant of coplanar- non-concurrent force systems and numerical problems. 5 hrs	05
Unit II		
4	<b>Chapter 4: Equilibrium of a force system (Chapter 3 contd..)</b> Conditions of equilibrium, types of support and loading for a statically determinate beam, Reactions at support connections, Numerical problems on equilibrium of force systems and support reactions for a statically determinate beam. 5 hrs	19
5	<b>Chapter 5: Static Friction</b> Introduction, types of friction, definition, limiting friction, coefficient of friction, laws of Coulomb friction, angle of friction and angle of repose, cone of friction. Wedge and belt friction theory. Derivation of belt friction formula. Numerical problems on, impending motion on horizontal and inclined planes (including connected bodies); wedge friction; Ladder friction and Belt friction. 8 hrs	
6	<b>Chapter 6: Simple Stress and Strain</b> Introduction, Properties of Materials, Stress, Strain, Elasticity, Elastic limit, Hooke's law & Young's modulus, Stress – Strain Diagram for structural steel, working stress and Factor of safety. Deformation of a bar due to force acting on it. Law of super position. Stresses in bars of uniform & varying cross sections. Composite sections. Problems connected to above topics. 6 hrs	
Unit – III		
7	<b>Chapter 7: Centroid of Plane Figures</b> Introduction, Definition, Methods of determining the centroid, axis of reference, axis of symmetry, Locating the centroid of simple plane figures (triangle, semicircle, quarter of a circle and sector of a circle etc..) using method of integration, Numerical problems on Centroid of simple built up sections. 5 hrs	10
8	<b>Chapter 8: Second moment of area (Plane figures)</b> Introduction, Definition, Method of determining the second moment of area, Section Modulus, Radius of gyration, perpendicular and Parallel axis theorems, Polar second moment of area, second moment of area of simple plane figures	





(triangle, rectangle, semicircle, circle etc.) using method of integration,  
Numerical problems on MI of simple built up sections.

5 hrs

**Text Book:**

1. Beer, F.P. and Johnston, R., *Mechanics for Engineers: Statics*, McGraw Hill Company, New York, 1988.
2. Bhavikatti, S.S., and Rajasshekarappa K.G., *Engineering Mechanics*, 3Ed., New Age International Pub. Pvt. Ltd., New Delhi, 2008.
3. Kumar, K.L., *Engineering Mechanics*, 3ed., Tata McGraw Hill Publishing Company, New Delhi, 2003.
4. Punmia, B.C., Jain, A. and Jain, A., *Mechanics of Materials*, Lakshmi Publications, New Delhi, 2006

**References:**

1. Jagadeesh, T.R. and Jayaram, *Elements of Civil Engineering*, Sapna Book House, Bangalore, 2006.
2. Ramamrutham, S., *Engineering Mechanics*, Dhanpat Rai Publishing Co., New Delhi, 1998.
3. Singer, F.L., *Engineering Mechanics*, 3<sup>rd</sup> edition Harper Collins, 1994.
4. Timoshenko, S.P. and Young, D.H., *Engineering Mechanics*, 4<sup>th</sup> edition, McGraw Hill Publishing Company, New Delhi, 1956.
5. Irving H Shames, *Engineering Mechanics*, 3<sup>rd</sup> edition, Prentice-Hall of India Pvt. Ltd, New Delhi- 110 001, 1995.

**FIRST SEMESTER B E PROGRAM 2019-20**  
**Electrical Science Stream Syllabi Content**

Program: <b>UG</b>		
Course Title: <b>C Programming for Problem solving</b>		Course Code: <b>18ECSP101</b>
L-T-P: <b>0-0-3</b>	Credits: <b>3</b>	Contact : <b>6 Hrs./week</b>
ISA Marks: <b>80</b>	ESA Marks: <b>20</b>	Total Marks: <b>100</b>
Teaching : <b>78 Hrs.</b>	Exam Duration: <b>3 Hrs.</b>	Semester : I

<b>1</b>	<b>Introduction to Problem solving</b> Introduction to algorithms / flowcharts and its notations, top down design, elementary problems.	<b>3 hrs</b>
<b>2</b>	<b>Basics of C programming language</b> Characteristics and uses of C, Structure of C program, C Tokens: Keywords, Identifiers, Variables, Constants, Operators, Data-types, Input and Output statements.	<b>15 hrs</b>
<b>3</b>	<b>Decision control statements</b> Conditional branching statements: if statement, if else statement, else if ladder, switch statement, unconditional branching statements: break, continue. Introduction to Debugging Skills Introduction to Test Driven Programming.	<b>12 hrs</b>
<b>4</b>	<b>Iterative statements</b> while, do while, for, nested statements	<b>10 hrs</b>
<b>5</b>	<b>Functions</b> Introduction, Function declaration, definition, call, returns statement, passing parameters to functions, introduction to macros. Introduction to Coding Standards	<b>10 hrs</b>
<b>6</b>	<b>Arrays and Strings</b> Introduction, Declaration, Accessing elements, Storing values in arrays, Operations on one dimensional array, Operations on two dimensional	<b>15 hrs</b>



	arrays, Introduction to Code Optimization and refactoring	
<b>7</b>	<b>Pointers</b> Introduction, declaring pointer, pointer variables, pointer expression and arithmetic, passing arguments to functions using pointers, pointers and arrays, passing an array to a function.	<b>08 hrs</b>
<b>8</b>	<b>Structures and Unions</b> Introduction, passing structures to functions, Array of structures, Unions	<b>05 hrs</b>
<b>Text Books</b> 1. R.G.Dromey, How to Solve it by Computer, 1ed, PHI, 2008. 2. Yashvant Kanetkar, Let us C ,15 <sup>th</sup> ed, BPS Publication, 2016.		
<b>Reference Books:</b> 1. B W Kernighan, D M Ritchie, The Programming language C, 2ed, PHI, 2004. 2. B S Gottfried, Programming with C, 2ed, TMH, 2006. 3. B.A. Forouzan, R.F. Gilberg, A Structured Program Approach Using C, 3ed, CENGAGE Learning, 2008.		



**FIRST SEMESTER B E PROGRAM 2019-20**  
**Electrical Science Stream Syllabi Content**

<b>Program: UG</b>		
<b>Course Code: 18EEEF101</b>	<b>Course Title: Basic Electrical Engineering</b>	
<b>L-T-P: 3-0-0</b>	<b>Credits: 3</b>	<b>Contact: 40 Hrs.</b>
<b>CIA Marks: 50</b>	<b>SEE Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching : 40 Hrs.</b>		<b>Exam Duration: 3 Hrs.</b>

<b>Chapter No.</b>	<b>Unit-I</b>	<b>Hours</b>
1	<b>Overview of Electrical Engineering</b> Specialization, scope & role, impact of Electrical Engineering on national economy, environment, Sources of generation, sustainability, challenges and opportunities for electrical engineers, electrical engineering marvels, future challenges.	<b>02</b>
2	<b>DC Circuits</b> Voltage and current sources, Kirchoff's current and voltage laws, loop and nodal analysis of simple circuits with dc excitation. Time-domain analysis of first-order RL and RC circuits.	<b>05</b>
3	<b>AC Circuits</b> Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase series and parallel R-L-C ac circuits. Three-phase balanced circuits, voltage and current relations in star and delta connections. power measurement using two watt meters	<b>08</b>
	<b>Unit-II</b>	
4	<b>Electrical Actuators</b> Electromagnetic principles, Solenoid, Relays, classification of Electric motors, DC motors-shunt, series, compound, separately excited, PMDC motors – Speed Control, Stepper Motors, BLDC motors, three phase induction motor, Characteristics and applications, selection of motors for various applications.	<b>9</b>



5	<b>Power Electronics</b> (Text1, chapter 45) Introductory, Thyristor, Some thyristor circuits, Limitations to thyristor operation, The thyristor in practice, The fully controlled AC/DC converter, AC/DC inversion, Switching devices in inverters, Three-phase rectifier networks, The three-phase fully controlled converter, Inverter-fed induction motors, Soft-starting induction motors, DC to DC conversion switched-mode power	6
<b>Unit-III</b>		
6	<b>Electrical Wiring, Safety and protection(Ref :Text3-page 1 to 10)</b> Types of wires and cables for internal wiring, Types of switches and Circuits, Types of wiring, Safety precautions and rules in handling electrical appliances, Electric shock, first aid for electrical shocks, Importance of grounding and earthing, Methods for earthing, Fuses, MCB, ELCB and Relays, Lockout and Tagout, Electrical Codes and Standards.	05
7	<b>Batteries:</b> Basics of lead acid batteries, Lithium Ion Battery , Battery storage capacity, Coulomb efficiency, Numerical of high and low charging rates, Battery sizing. Numericals.	05

<b>Text Books</b>	
1	Hughes, Electrical & Electronic Technology, 8th , Pearson Education, 2001
2	P C Sen, Principals of Electrical Machines and Power Electronics, 2nd, Wiley Publications
3	Gilbert M Masters, Renewable and efficient Electrical Power systems, Published by John Wiley & Sons 2004 edition
4	Frank D. Petruzella, Electric Motors and Control Systems, McGraw Hill Education Private Limited 2009 Edition
<b>Reference Books:</b>	
1	D C Kulshreshtha, Basic Electrical Engineering, Mc Graw Hill Publications
2	David G Alciatore and Michel B Histan, Introduction to Mechatronics and Measurement Systems, 3rd, Tata McGraw Hill Education Private Limited, New Delhi., 2005
3	Vincent Del Toro, Electrical Engineering Fundamentals, 2 <sup>nd</sup> edition Prentice Hall India

**FIRST SEMESTER B E PROGRAM 2019-20**  
**Electrical Science Stream Syllabi Content**

<b>Course Code: 15EHSP101</b>	<b>Course Title: Social Innovation</b>	
<b>L-T-P-Self Study: 0-1-1</b>	<b>Credits: 2</b>	<b>Contact Hrs: 28</b>
<b>ESA Marks: 80</b>	<b>ISA Marks: 20</b>	<b>Total Marks: 100</b>
<b>Teaching Hrs: 28</b>		<b>Exam Duration: 3 hrs</b>



Module	Topics	Assignments	Support activities / Tools	
KNOWLEDGE, TOOLS & DEVELOPMENT	Course sensitization	<p><b>1.</b> Introduction to Social Innovation:</p> <ul style="list-style-type: none"> <li>Awakening social consciousness (<a href="http://www.yourstory.com">www.yourstory.com</a>)</li> <li>Social Innovation and Leadership</li> <li>Engineering &amp; Social innovation (EPICS) (<b>Connecting SI Course to Mini Project, Capstone Project, Campus Placements</b>)</li> <li>Course Overview</li> <li><b>Students' Self Introduction Activity</b></li> <li>Group formation <b>Activity</b></li> </ul>	<p><u>Reading assignments</u></p> <ul style="list-style-type: none"> <li>Read the handout on "The Process of Social Innovation" by Geoff Mulgan</li> <li>Design thinking for Social Innovation</li> </ul> <p><u>Written Assignments</u></p> <ul style="list-style-type: none"> <li>Writing about Akshaya Patra in class. (Background information about Akshaya patra and the Social Cause it is addressing)</li> <li>Brainstorming Session on Social Innovators in Class</li> </ul>	<ul style="list-style-type: none"> <li>Class activity on Behavioral Blocks to Innovation <b>Discussion on the behavioural blocks.</b></li> <li><b>Introducing oneself with three Adjectives- Appreciating diversity and discovering self</b></li> <li><b>Group Formation Activity (Forming square)</b> (Making four equilateral triangles out of popsicle sticks to enhance group cohesiveness amongst the group mates)</li> </ul>
	Create Mindsets	<p><b>Seven Mindsets:</b></p> <ol style="list-style-type: none"> <li>Empathy (<b>Example of The Boy and the Puppies</b>)</li> <li>Optimism ( <b>Person Paralyzed waist down / Glass Half full Half Empty</b>)</li> <li>Iteration (<b>Thomas Alva Edison</b>)</li> <li>Creative Confidence (<b>Origami – Josef Albers</b>)</li> <li>Making it</li> <li>Embracing Ambiguity (<b>Confusion is the Welcome doormat at the door of Creativity</b>)</li> <li>Learning from Failure (<b>Designing Website first and then asking the stakeholders about the website</b>) (<b>Spending one lakh for the business which is never launched</b>)</li> </ol>	<p><u>Reading assignments</u></p> <ul style="list-style-type: none"> <li>Handout on " Create Mindsets"</li> </ul>	<ul style="list-style-type: none"> <li>(<b>How to train the Dragon? Common Video for all the mindsets</b>)</li> <li><b>Watching in Class TED Talk on "How to build your Creative Confidence by David Kelley – IDEO Founder)</b></li> </ul>
	Process of Social Innovation	<p><b>Engage</b></p> <p>Community study and Issue Identification</p>	<p><u>Reading assignments</u></p> <ul style="list-style-type: none"> <li>Handout on Community Study and Issue Identification</li> <li>Case Study on "EGramSeva"</li> <li>Case Study on "Janani Agri Serve"</li> </ul>	<ul style="list-style-type: none"> <li>Activity on Observation skills To know how to use one's observation skills in understanding the social conditions</li> <li>Experience sharing by senior</li> </ul>



			<p><b><u>Class Presentations</u></b></p> <ul style="list-style-type: none"> <li>Initial observations being made by the group</li> </ul> <p>( Literature Survey of Places of Hubli- Dharwad)</p> <p><a href="http://www.readwhere.com">www.readwhere.com</a></p> <ul style="list-style-type: none"> <li>Detailed interaction / engagements with the society and finalize the social issue for intervention</li> </ul> <p><b>Use template 1: Frame your Design Challenge</b></p>	<p>students</p> <ul style="list-style-type: none"> <li>Brainstorming Deliberations on the initial observations and arrive at the "Social Issue"</li> <li>Familiarization of the respective templates with the help of sample case study</li> </ul>
<b>PEER REVIEW</b>				
		<p><b>2. Inspiration</b></p> <ul style="list-style-type: none"> <li>Plan for the Research</li> <li>Development of Interview guide</li> <li>Capture your Learnings</li> </ul>	<p><b><u>Reading assignments</u></b></p> <ul style="list-style-type: none"> <li>Handout on Overview of Inspiration</li> </ul> <p><b><u>Class Presentations</u></b></p> <ul style="list-style-type: none"> <li>Entirety of the Social Issue</li> <li>Identification of the Stake Holders</li> </ul> <p>(Examples on Fluorescent Curtain and Students' Punctuality for Class)</p> <ul style="list-style-type: none"> <li>Interview Questions</li> </ul> <p>(Role Play on Interview with Stakeholders)</p> <ul style="list-style-type: none"> <li>Category wise Learnings capture</li> </ul> <p><b>Use template 2: Plan your Research</b></p> <p><b>Template 3. Development of Interview Guide</b></p> <p><b>Template 4. Capture your Learning</b></p>	<ul style="list-style-type: none"> <li>Familiarization of the respective templates with the help of sample case study</li> </ul>
		<p><b>3. Ideation</b> <b>3.1 Synthesis</b></p> <ul style="list-style-type: none"> <li>Search for meaning</li> <li>Create "How might we"</li> </ul>	<p><b><u>Reading assignments</u></b></p> <ul style="list-style-type: none"> <li>Handout on Overview of Ideation-Synthesis</li> </ul>	<ul style="list-style-type: none"> <li>Familiarization of the respective templates with the help of sample case study</li> </ul>





		<p>question</p>	<p><b><u>Class Presentations</u></b></p> <ul style="list-style-type: none"> <li>• Create insights</li> <li>• “How might we” questions</li> </ul> <p><b>Use template 5: Create Insights</b></p> <p><b>Template 6: Create “How Might We’ Questions</b></p>	
<b>PEER REVIEW</b>				
		<p><b>3.0 Ideation</b></p> <p><b>3.2 Prototyping</b></p> <ul style="list-style-type: none"> <li>• Generate Ideas</li> <li>• Select Promising Ideas</li> <li>• Determine what to prototype</li> <li>• Make your prototype</li> <li>• Test and get feedback</li> </ul>	<p><b><u>Reading assignments</u></b></p> <ul style="list-style-type: none"> <li>• Handout on Overview of Ideation-Prototyping</li> </ul> <p><b><u>Class Presentations</u></b></p> <ul style="list-style-type: none"> <li>• Story board-demonstrating the possible solutions</li> </ul> <p><b>Use template 7: Select your best ideas</b></p> <p><b>Template 8 : Determine what to prototype</b></p>	<ul style="list-style-type: none"> <li>• Brain storming</li> <li>• Familiarization of the respective templates with the help of sample case study</li> <li>• Activity on Risk management</li> <li>• Activity on Resource management</li> </ul> <p>Structure building games</p>
		<p><b>4.0 Implementation</b></p> <ul style="list-style-type: none"> <li>• Create an action plan</li> <li>• Community Partners</li> </ul> <p>(if any)</p> <ul style="list-style-type: none"> <li>• Budgeting &amp; Fundraising</li> </ul> <ol style="list-style-type: none"> <li>1. Peer to Peer</li> <li>2. Crowd Funding</li> <li>3. Giving Kiosks</li> <li>4. Donation</li> <li>5. Envelop Funding</li> <li>6. Marathons/ Walkathons</li> <li>7. Conducting Yoga Classes</li> </ol> <p>( <a href="http://www.causevox.com">www.causevox.com</a> / <a href="http://www.blog.fundly.com">www.blog.fundly.com</a> )</p> <ul style="list-style-type: none"> <li>• Duration</li> <li>• Ethical concerns</li> <li>• Launch your solution</li> <li>• Feedback (Impact)</li> </ul>	<p><b><u>Reading assignments</u></b></p> <ul style="list-style-type: none"> <li>• Handout on Overview of Implementation</li> </ul> <p><b><u>Class Presentations</u></b></p> <ul style="list-style-type: none"> <li>• Pilot implementation plan with required resources and Budget indicating stake holders &amp; their engagement</li> </ul>	<ul style="list-style-type: none"> <li>• Familiarization of the respective templates with the help of sample case study</li> </ul>



		<b>5.0 Reflect</b>  Reflection of the overall learning by the students	<b><u>Reading assignments</u></b>  • Handout on Overview of students Reflection <b>Use template 9: Reflection on the Process</b>  <b><u>Class Presentations</u></b>  Final Presentation- After Implementation	<ul style="list-style-type: none"><li>• Familiarization of the respective templates with the help of sample case study</li></ul>



**FIRST SEMESTER B E PROGRAM 2019-20**  
**Electrical Science Stream Syllabi Content**

<b>Course Code: 16EPHP101</b>		<b>Course Title: Engineering Physics lab</b>	
<b>L-T-P: 0-0-1</b>		<b>Credits : 1</b>	<b>Contact Hrs.: 02 Hrs./Week</b>
<b>CIE Marks: 80</b>		<b>SEE Marks: 20</b>	<b>Total Marks: 100</b>
<b>Teaching Hrs.: 24</b>		<b>Examination Duration: 3 Hrs.</b>	
<b>Experiments</b>			
<b>1.</b>	Four probe method		
<b>2.</b>	V-I characteristics of p-n junction diode		
<b>3.</b>	Zener diode characteristics		
<b>4.</b>	Hysteresis loss		
<b>5.</b>	Transistor characteristics		
<b>6.</b>	Measurement of dielectric constant		
<b>7.</b>	Resonance frequency of LCR circuits		
<b>8.</b>	Study of frequency response of passive components		
<b>9.</b>	Calibration of thermocouple		
<b>10.</b>	Calibration of electrical meters		



**FIRST SEMESTER B E PROGRAM 2019-20**  
**Mechanical Science Stream Syllabi Content**

<b>Program: UG</b>		
<b>Course Title: Single variable Calculus</b>		<b>Course Code: 18EMAB101</b>
<b>L-T-P: 4-1-0</b>	<b>Credits: 05</b>	<b>Contact Hours: 50</b>
<b>CIE Marks: 50</b>	<b>SEE Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching Hours: 04</b>	<b>Examination Duration: 3hrs</b>	
<p><b>Unit I</b></p> <p><b>1. Functions, Graphs and Models</b></p> <p><b>07 hours</b></p> <p>Functions, types of functions, transformations and models (Linear, exponential, trigonometric).</p> <p><b>MATLAB:</b> Graphing functions, Domain-Range and Interpreting the models</p> <p><b>2. Calculus of functions and models</b></p> <p><b>13 hours</b></p> <p>Limit of a function, Infinite limits- graph, Continuity and discontinuity, Intermediate value theorem statement, Roots of the equation using Bisection Method and Newton- Raphson Method</p> <p>Interpretation of derivative as a rate of change, All the rules of derivatives (List only), Maxima, Minima and optimization problems. Curvature and Radius of Curvature, Indeterminate forms, L- Hospital's rule-Examples</p> <p><b>MATLAB:</b> optimization problems. Curvature problems</p>		
<p><b>Unit II</b></p> <p><b>3. Infinite Series</b> <span style="float: right;"><b>06 hours</b></span></p> <p>Definition, Convergence of series, Tests of convergence – p-series, Alternating series. Power series, radius of convergence, Taylor's and Maclaurin's series, Applications of Taylor's and Maclaurin's series</p> <p><b>MATLAB:</b> Convergence of series</p> <p><b>4. Integral calculus</b> <span style="float: right;"><b>14 hours</b></span></p> <p>Tracing of standard curves in Cartesian form ,Parametric form and Polar form; Beta and gamma</p>		

function, relation between them, evaluation of integrals using Beta and gamma functions; Applications to find arc length, Area, Volume and surface area (Cartesian, parametric and polar curves). Approximate integration- Trapezoidal rule, Simpson's 1/3 rule

**MATLAB:** problems on arc length, area, volume and surface area

### Unit III

#### 5. Ordinary differential equations of first order

**10 hours**

(a) Introduction to Initial Value problems. Linear and Bernoulli's equations, Exact equations and reducible to exact form, Numerical solution to Initial Value problems-Euler's method, Modified Euler's method and Runge-Kutta method

(b) Applications of first order differential equations-Orthogonal trajectories growth and decay problems, mixture problems, Electrical circuits, falling bodies.

**MATLAB:** Solve differential equations

#### Text Books

2. Early Transcendentals Calculus- James Stewart, Thomson Books, 7ed 2010.

#### Reference Books:

3. Calculus Single and Multivariable, Hughues-Hallett Gleason, Wiley India Ed, 4ed, 2009.
4. Thomas Calculus, George B Thomas, Pearson India, 12ed, 2010



**FIRST SEMESTER B E PROGRAM 2019-20**  
**Mechanical Science Stream Syllabi Content**

<b>Program: UG</b>		
<b>Course Title: Engineering Chemistry</b>		<b>Course Code: 15ECHB101</b>
<b>L-T-P: 3-0-0</b>	<b>Credits: 03</b>	<b>Contact Hours: 40</b>
<b>CIE Marks: 50</b>	<b>SEE Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching Hours: 03</b>	<b>Examination Duration: 3hrs</b>	
<b>Unit-I</b>		
<b>1. Pure substances</b>		
<p>Properties of pure substance (Steam), two property rule, T-H diagram, formation of steam at constant pressure. Different states of steam: Wet steam-dryness fraction, determination by separating-throttling calorimeter, Dry saturated steam, Superheated steam, thermodynamic parameters of steam, steam table, numerical problems.</p> <p>T-V, P-V &amp; P-T diagrams of pure substance taking water as example. Triple point &amp; critical point. Sub-cooled liquid, saturated liquid, mixture of saturated liquid &amp; vapor, Saturated vapor &amp; superheated vapor states.</p> <p style="text-align: right;"><b>08Hrs</b></p>		
<b>2. Real and ideal gases</b>		
<p>Properties of Real and Ideal gases. Vander Waal's equation, Vander Waal's constant in terms of critical properties –numerical problems. Compressibility factor, compressibility chart and Law of corresponding state. Ideal gas: equation of state, internal energy and enthalpy as functions of temperature. Ideal gas mixture: Dalton's law of additive pressures and Amagat's law of additive volumes. Terms used in the analysis of mixture of gases - numerical problems.</p> <p style="text-align: right;"><b>05Hrs</b></p>		
<b>3. Engineering Materials</b>		
<p>Ferrous metals – properties and applications of Iron and Steel. Ferrous metal s – properties and Applications of copper and aluminium.</p> <p>Cement- properties, mechanism of setting &amp; hardening of cement and applications.</p> <p>Lubricants- Properties –viscosity, flash point, fire point, cloud point and pour point, mechanism- hydrodynamic and boundary lubrication and applications.</p> <p style="text-align: right;"><b>03Hrs</b></p>		



### Unit – II

#### 4. Fuel Chemistry

Fuels, classification, determination of calorific value of a fuel (solid / liquid fuel by Bomb calorimeter), coal analysis- Numerical problems. Petroleum - cracking, Octane number, Cetane number, reforming, and mechanism of knocking in Petrol and Diesel engines. Renewable energy sources – power alcohol and bio diesel.

06Hrs

#### 5. Energy Storage and Conversion Systems

Electrode potential, Nernst equation, Formation of a cell; Reference electrodes – Calomel electrode and Determination of electrode potential using calomel electrode, numerical problems on  $E$ ,  $E_{\text{cell}}$ ,  $E^{\circ}_{\text{cell}}$ .

Batteries: Classification, characteristics, Lead-acid and Li ion batteries.

Fuel cells: Methanol- $O_2$  fuel cell.

06Hrs

#### 6. Surface Chemistry

Corrosion: Electrochemical theory of corrosion taking iron as an example; corrosion control –galvanization and tinning.

Metal Finishing: Technological importance of metal finishing, Electroplating, factors affecting nature of electrodeposit- Throwing power of plating bath solution- numerical problems. Electro less plating – advantages over electroplating, electro less plating of copper and its applications in the manufacture of printed circuit board..

04Hrs

### Unit – III

#### 7. Polymers

Introduction, free radical mechanism of addition polymerization taking Ethylene as an example; commercial polymers - Plexi glass, polyurethane and polystyrene. Adhesives – synthesis, properties as applications of Epoxy resins; Polymer Composites - structure, properties and applications of Kevlar and carbon fiber.

04 Hrs

#### 8. Environmental Chemistry:

Water: Sources and ill effects of water pollutants- fluoride and nitrate; Determination of total hardness of water by EDTS method – numerical problems. Sewage: Determination of biological oxygen demand by Winkler's method – numerical problems and determination of chemical oxygen demand - numerical problems,

0Hrs

**Text Books:**

1. A text Book of Engineering Chemistry, 1st edition, Dara. S. S, S. Chand & Co. Ltd., 2009, New Delhi.
2. A text Book of Engineering Chemistry, 16th edition, Jain P.C and Jain M, Dhanpat Rai Publications, 2006, New Delhi.

**Reference Books:**

1. An introduction to Thermodynamics, Y V C Rao, Revised Edition, University Press, 2009 Hyderabad.
2. Hand book of batteries , David Linden, Thomas B Reddy, 3rd edition McGraw Hill publications, 2001.
3. Puri B. R., Sharma L.R. and Pathania M. S., Principles of Physical Chemistry, 33rd Edition, S Nagin Chand & Co.,1992.
4. Fontana M G, Corrosion Engineering, 3<sup>rd</sup> Edition, McGraw Hill Publications, 1986.
5. Billmeyer F W, Text Book of Polymer Science, John Wiley &Son's, 1994.
6. Principles of Polymer Chemistry- A. Ravve Plelum Press, New York and London.
7. Callister William D, Materials Science and Engineering: An introduction, John Wiley and Sons 2007: 721 pages.



**FIRST SEMESTER B E PROGRAM 2019-20**  
**Mechanical Science Stream Syllabi Content**

Course Title: <b>C Programming for Problem Solving</b>		Course Code: <b>18ECSP101</b>
L-T-P: <b>0-0-3</b>	Credits: <b>3</b>	Contact Hrs: <b>6 hrs/week</b>
ISA Marks: <b>80</b>	ESA Marks: <b>20</b>	Total Marks: <b>100</b>
Teaching Hrs: 78	Exam Duration: <b>3 hrs</b>	Semester : I

<b>1</b>	<b>Introduction to Problem solving</b> Introduction to algorithms / flowcharts and its notations, top down design, elementary problems.	<b>3 hrs</b>
<b>2</b>	<b>Basics of C programming language</b> Characteristics and uses of C, Structure of C program, C Tokens: Keywords, Identifiers, Variables, Constants, Operators, Data-types, Input and Output statements.	<b>15 hrs</b>
<b>3</b>	<b>Decision control statements</b> Conditional branching statements: if statement, if else statement, else if ladder, switch statement, unconditional branching statements: break, continue. Introduction to Debugging Skills Introduction to Test Driven Programming.	<b>12 hrs</b>
<b>4</b>	<b>Iterative statements</b> while, do while, for, nested statements	<b>10 hrs</b>
<b>5</b>	<b>Functions</b> Introduction, Function declaration, definition, call, returns statement, passing parameters to functions, introduction to macros. Introduction to Coding Standards	<b>10 hrs</b>
<b>6</b>	<b>Arrays and Strings</b> Introduction, Declaration, Accessing elements, Storing values in arrays, Operations on one dimensional array, Operations on two dimensional	<b>15 hrs</b>

	arrays, Introduction to Code Optimization and refactoring	
<b>7</b>	<b>Pointers</b> Introduction, declaring pointer, pointer variables, pointer expression and arithmetic, passing arguments to functions using pointers, pointers and arrays, passing an array to a function.	<b>08 hrs</b>
<b>8</b>	<b>Structures and Unions</b> Introduction, passing structures to functions, Array of structures, Unions	<b>05 hrs</b>
<p><b>Text Books</b></p> <p>3. R.G.Dromey, How to Solve it by Computer, 1ed, PHI, 2008.</p> <p>4. Yashvant Kanetkar, Let us C ,15<sup>th</sup> ed, BPS Publication, 2016.</p>		
<p><b>Reference Books:</b></p> <p>4. B W Kernighan, D M Ritchie, The Programming language C, 2ed, PHI, 2004.</p> <p>5. B S Gottfried, Programming with C, 2ed, TMH, 2006.</p> <p>6. B.A. Forouzan, R.F. Gilberg, A Structured Program Approach Using C, 3ed, CENGAGE Learning, 2008.</p>		



**FIRST SEMESTER B E PROGRAM 2019-20**  
**Mechanical Science Stream Syllabi Content**

<b>Program: UG</b>		
<b>Course Code: 15ECRP101</b>	<b>Course Title: Engineering Exploration</b>	
<b>L-T-P: 0-0-3</b>	<b>Credits: 3</b>	<b>Contact Hrs: 78</b>
<b>CIE Marks: 80</b>	<b>SEE Marks: 20</b>	<b>Total Marks: 100</b>
<b>Teaching : 78 Hrs.</b>		<b>SEE Exam Duration: 3 Hrs.</b>

No	Content	Sessions
1	Introduction to Engineering and Engineering Study	1
2	Role of Analysis in Engineering, Analysis Methodology	2
3	Data Analysis Graphing	2
4	Basics of Engineering Design, Multidisciplinary Nature of Engineering Design	5
5	Project Management	1
6	Sustainability in Engineering	2
7	Ethics	1
8	Modeling, Simulation and Data Acquisition using Software Tool	1
9	Platform based development : Arduino	3
9	Course Project	3

**Reference Books:**

1. Engineering Fundamentals & Problem Solving by Arvid Eide, Roland Jenison, Larry Northup, Steven, Mc GrawHill Higher Education, 6<sup>th</sup> Edition ( 2011)
2. Engineering Exploration ( Edited Book, 2008) by Pearson Publication

**Evaluation Scheme**

Chapter No	Name	Weightage in percentage
1	Introduction to Engineering and Engineering Study	-
2	Role of Analysis in Engineering	10
3	Analysis Methodology	
4	Data Analysis Graphing	10



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5	Basics of Engineering Design	20
	Multidisciplinary Nature of Engineering Design	
6	Project Management	5
7	Sustainability in Engineering	10
8	Ethics	5
9	Modelling, Simulation and Data Acquisition using Software Tool	-
10	Platform Based Development: Arduino	-
10	Course Project	40

**Mechanical Science Stream Syllabi Content**

<b>Program: UG</b>			<b>Teaching Hours</b>
<b>Course Title: Basic Electronics</b>		<b>Course Code: 18EECF102</b>	
<b>L-T-P: 4-0-0</b>	<b>Credits: 4</b>	<b>Contact Hours: 4Hrs/week</b>	
<b>ISA Marks: 50</b>	<b>ESA Marks: 50</b>	<b>Total Marks: 100</b>	
<b>Teaching Hours: 50 Hrs.</b>	<b>Examination Duration: 3 Hrs.</b>		
<b>Unit I</b>			
<b>Chapter 1: Overview of Electronics in Mechanical Engineering</b> Definition & overview of Mechatronics, Mechatronics and Design Innovation, Mechatronics and Manufacturing, Mechatronics and Education; Typical Mechatronics Components; Sensors and Transducers.			<b>03</b>
<b>Chapter 2: Semiconductor Devices and Applications:</b> PN junction diode, characteristics and parameters, diode approximations, half wave rectifier, full wave bridge rectifier, full wave bridge rectifier capacitor filter, Zener diode, Voltage regulator design, BJT, Darlington Pair, JFET, MOSFET, UJT, SCR.			<b>10</b>
<b>Chapter 3: Operational Amplifiers:</b> Ideal op-amp characteristics, op-amp applications: Comparator, Inverting amplifier, Non-inverting amplifier, Voltage follower, Integration, Differentiation, Adder, Subtractor and numerical as applicable.			<b>08</b>
<b>Unit II</b>			
<b>Chapter 4: Digital Logic:</b> Digital Number system: Binary & Hexadecimal number systems, Conversion, BCD Number system, Gray code, Data word representation , Binary Arithmetic, Boolean Algebra, Logic gates, Combinational & Sequential circuits, Adders, Flip-Flops, Registers, Counters, Multiplexer.			<b>13</b>
<b>Introduction to Digital Electronics (Text-2):</b> Introduction, Switching and Logic Levels using circuits, Digital Waveform (Sections 9.1to 9.3).Number system: Binary, Octal Decimal and Hexadecimal, Inter Conversion, BCD Number system, Gray code, Data word representation , Binary Arithmetic, Boolean Algebra: Laws, rules & theorems of Boolean algebra, Sum of products form ( SOP ), products of sum form (POS) of Boolean functions. Study of Karnaugh Maps ( K-maps) for 2, 3 & 4 variables only. Logic gates, Adders, Encoder, Decoder, Multiplexer and Demultiplexer. Combinational & Sequential circuits, Latches and Flip-Flops(SR, JK, D, T),			

	<b>06</b>
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<b>Chapter 5: Sensors and Transducers :</b> Introduction, Classification of sensors and transducers, Contact type – Mechanical switches, Non-contact type - proximity sensors & Hall sensors, principle of working of light sensors, Future Challenges	
<b>Unit – III</b>	
<b>Chapter 6: Signal Conditioning:</b> Analog & Digital signals, Digital to Analog Conversion, R-2R DAC, Analog to Digital Conversion, SAR ADC, Data Acquisition.	<b>06</b>
<b>Chapter 7: Case Studies of Mechatronic Systems:</b> Automatic Camera, Drilling Machine, Bar code reader.	<b>04</b>
<b>Text Book</b> <ol style="list-style-type: none"><li>1. David A Bell, “Electronic devices and Circuits” , PHI New Delhi, 2004.</li><li>2. Morris Mano, “Digital logic and Computer design” 21st Indian print Prentice Hall India, 2000.</li><li>3. W.Bolton, "Mechatronics - Electronic Control Systems in Mechanical and Electrical Engineering", 3<sup>rd</sup> edition Pearson Education, 2005.</li><li>4. David Bradley and David W., “Mechatronics in Action”, 2nd edition, Springer, 2010</li></ol>	
<b>References</b> <ol style="list-style-type: none"><li>1. David G Alciatore, Michael B Histan, “Introduction to Mechatronics and Measurement Systems”, TMH 3<sup>rd</sup> edition, 2007.</li><li>2. K.A Krishnamurthy and M.R.Raghuveer, “Electrical, Electronics and Computer Engineering for Scientist and Engineers”, Second Edition New Age International Publishers, Wiley Eastern, 2001.</li><li>3. P. Malvino, “Electronic Principles” Sixth edition Tata McGraw Hill, 1999.</li><li>4. Floyd, “Digital fundamentals” Third Edition Prentice Hall India, 2001</li><li>5. BoylesteadNashelsky, “Electronic devices &amp; Circuit theory” Sixth Edition Prentice Hall India, 2000.</li><li>6. RamakantGayekawad “Operational Amplifiers &amp; applications” 3<sup>rd</sup> Edition, PHI, 2000.</li></ol>	



**FIRST SEMESTER B E PROGRAM 2019-20**  
**Mechanical Science Stream Syllabi Content**

<b>Program: UG</b>				
<b>Course code: 15EECF101</b>		<b>Course Title: <b>Basic Mechanical Engineering</b></b>		
<b>L-T-P: 2-1-0</b>		<b>Credits: 3</b>	<b>Contact Hrs.: 4</b>	
<b>CIE Marks: 50</b>		<b>SEE Marks: 50</b>	<b>Total Marks: 100</b>	
<b>Teaching Hrs: 50</b>			<b>Exam Duration: 3 hrs</b>	
<b>Chapter</b>	<b>Contents</b>	<b>Hours</b>	<b>Tutorial</b>	<b>Sessions</b>
<b>UNIT I</b>				
1	<b>Introduction to Mechanical Engineering:</b> Definition of engineering, Mechanical Engineering, Branches of Mechanical Engineering, Who are Mechanical Engineers?, Mechanical Engineers' top ten achievements.	2	Visit to Workshop and Machine Shop, Tools, Safety Precautions Video presentations	1
2	<b>Manufacturing Engineering: Basics of Manufacturing</b> What is manufacturing?, The main manufacturing sectors, The importance of the main manufacturing sectors to the Indian economy, Scales of production Classification of manufacturing Processes. Advances in Manufacturing: CNC machines, Mechatronics and applications	8	Demonstration on working of Lathe, milling, drilling, grinding machines Demonstration on Welding (Electric Arc Welding, Gas Welding, Soldering) Demonstration and Exercises on Sheet metal work. Visit to Learning Factory	5
<b>UNIT II</b>				
3	<b>Design Engineering: Power Transmission Elements</b> Overview Design Application: <ul style="list-style-type: none"> <li>Belt Drives. Types, Length of Belt. Velocity Ratio, Initial Tension. Ratio of Tensions. Power Transmitted, Numerical</li> </ul>	6	Design Problems like <a href="#">a moving experience</a> , aluminium can crusher Video presentations	5

	<p>Problems.</p> <ul style="list-style-type: none"> <li>Gears. Spur Gear, Rack and Pinion, Worm Gear, Bevel Gear, Helical Gears. Speed, Torque, and Power in Gear pair. Simple and Compound Gear trains. Numerical Problems.</li> <li>Ball and Roller Bearings, Types, Applications.</li> </ul>			
4	<p><b>Thermal Engineering 1: Prime Movers.</b></p> <p>Internal Combustion Engines: Classification, IC engine parts, 2 stroke SI and CI engine, 4 Stroke SI and CI Engine, PV diagrams of Otto and Diesel cycles, Comparison of 2 stroke and 4 stroke engine, comparison of CI and SI engine, Problems on Engine Performance, Future trends in IC engines.</p>	4	<p>Case study on power requirement of a bike, car or any machine</p> <p>Video presentations</p>	1
<b>UNIT III</b>				
5	<p><b>Thermal Engineering 2: Thermal Systems' Applications</b></p> <p>Refrigeration system, Air conditioning system, Pumps, Blowers and Compressors, Turbines, and their working principle and specifications.</p>	5	<p>Case study on selection of various thermal systems</p> <p>Video presentations</p>	1

**Text Books:**

- Jonathan Wickert and Kemper Lewis, An Introduction to Mechanical Engineering, Third Edition, 2013- Cengage Learning.4
- K.R.Gopalkrishna, SudhirGopalkrishna, S.C. Sharma. A Text Book of Elements of Mechanical Engineering, 30th Edition, Oct 2010,–Subhash Publishers, Bangalore.

**Reference Books:**

- Course Material developed by the Department of Mechanical Engineering.
- SKH Chowdhary, AKH Chowdhary, Nirjhar Roy, The Elements of Workshop Technology - Vol I & II , 11th edition 2001, Media Promoters and Publishers.
  - Basic Manufacturing, Roger Timings, Third edition, Newnes, An imprint of Elsevier



**FIRST SEMESTER B E PROGRAM 2019-20**  
**Mechanical Science Stream Syllabi Content**

<b>Course Code: 15EHS101</b>	<b>Course Title: Professional Communication</b>	
<b>L-T-P-Self Study: 1-1-0-0</b>	<b>Credits: 2</b>	<b>Contact Hrs: 42</b>
<b>ESA Marks: 50</b>	<b>ISA Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching Hrs: 42</b>		<b>Exam Duration: 3 hrs</b>

<b>Content</b>	<b>Hrs</b>
<b>Chapter No. 1. Basics- English Communication</b> Course Introduction, Explanation of template mix-ups with correct usages & necessity of grammar in error detection, Usage of tenses	9 hrs
<b>Chapter No. 2. Vocabulary and grammar</b> Vocabulary, Word Formation and Active and Passive Voice	6 hrs
<b>Chapter No. 3. Bouncing Practice</b> Definition and types of bouncing and its practice with examples, reading skills, free style speech. Individual presentation.	6 hrs
<b>Chapter No. 4. Rephrasing and Structures</b> Comprehension and Rephrasing, PNQ Paradigm and Structural practice	8 hrs
<b>Chapter No. 5. Dialogues</b> Introduction of dialogues, Situational Role plays,	3 hrs
<b>Chapter No. 6. Business Communication</b> Covering letter, formal letters, Construction of paragraphs on any given general topic.	9 hrs



***Text Book:***

***References:***

**References:**

1. Collins Cobuild Advanced Learner's English Dictionary
2. Raymond Murphy - Intermediate English Grammar, Cambridge University Press
3. Martin Hewings- Advanced English Grammar, Cambridge University Press.



**SECOND SEMESTER B E PROGRAM SCHEME FOR 2019-20**

**Mechanical Science Stream**

**This stream comprises of Departments of Mechanical Engg / Civil Engg / Bo Technology / Automation and Robotics**

No	Code	Course	Category	L-T-P	Credits	Contact Hours	ISA	ESA	Total	Exam Duration
1	18EMAB102	Multivariable Calculus	BS	4-1-0	5	6	50	50	100	3 hours
2	15EPHB102	Engineering Physics	BS	3-0-0	3	3	50	50	100	3 hours
3	15ECVF102	Engineering Mechanics	ES	4-0-0	4	4	50	50	100	3 hours
4	15EMEP101	Computer Aided Engineering Drawing	ES	0-0-3	3	6	80	20	100	3 hours
5	18EEEF102	Basic Electrical Engineering	ES	3-0-0	3	3	50	50	100	3 hours
6	15EHSP101	Social Innovation	HSS	0-1-1	2	3	80	20	100	3 hours
7	16EPHP102	Engineering Physics Lab	BS	0-0-1	1	2	80	20	100	3 hours
Total				14-2-5	21	27				

**Electrical Science Stream**

**This stream comprises of Departments of Electrical Engg / Electronics & communication Engg /Computer Science and Engg.**

No	Code	Course	Catego	L-T-P	Credit	Contact Hours	ISA	ESA	Total	Exam Duration
1	18EMAB102	Multivariable Calculus	BS	4-1-0	5	6	50	50	100	3 hrs.
2	15ECHB102	Engineering Chemistry	BS	3-0-0	3	3	50	50	100	3 hrs.
3	18ECSP102	Problem Solving with Data Structures	ES	0-0-3	3	6	80	20	100	3 hrs.
4	15ECRP101	Engineering Exploration	ES	0-0-3	3	6	80	20	100	3 hrs.
5	18EECF101	Basic Electronics	ES	4-0-0	4	4	50	50	100	3 hrs.
6	15EMEF101	Basic Mechanical Engg.	ES	2-1-0	3	4	50	50	100	3 hrs.
7	15EHSH101	Professional Communication	HSS	1-1-0	2	3	50	50	100	3 hrs.
Total				15-2-6	23	32				



**SECOND SEMESTER B E PROGRAM 2019-20**  
**Mechanical Science Stream Syllabi Content**

<b>Program: UG</b>		
<b>Course Title: Multivariable calculus</b>		<b>Course Code: 18EMAB102</b>
<b>L-T-P: 4-1-0</b>	<b>Credits: 05</b>	<b>Contact Hours: 50</b>
<b>ISA Marks: 50</b>	<b>ESA Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching Hours: 05</b>	<b>Examination Duration: 3hrs.</b>	
<b>Unit I</b>		
<b>1. Partial differentiation</b> Function of several variables, Partial derivatives, Level curves, Chain rule, Errors and Approximations. Extreme value problems. Lagrange's multipliers.		<b>12 hours</b>
<b>2. Double integrals</b> Double integrals- Rectangular and polar coordinates, Change the order of integration. Change of variables, Jacobian. Application of double integrals <b>MATLAB:</b> optimization problems, application of double integrals		<b>08 hours</b>
<b>Unit II</b>		
<b>3. Triple integrals</b> Triple integrals, Cartesian, change to Cylindrical and Spherical coordinates Application of Triple integrals		<b>07 hours</b>
<b>4. Calculus of Vector Fields</b> Vector fields, Gradient and directional derivatives. Line and Surface integrals. Independence of path and potential functions. Green's theorem, Divergence of vector field, Divergence theorem, Curl of vector field. Stokes theorem. <b>MATLAB:</b> application of Triple integrals, Vector calculus problems		<b>13 hours</b>
<b>Unit III</b>		
<b>5. Differential equations of higher orders</b> (a) Linear differential equations of second and higher order with constant coefficients The method of Variation of parameters. Initial and boundary value problems. (b) Applications of second order differential equations-Newton's 2 <sup>nd</sup> law, electrical circuits, Simple Harmonic motion. Series solution of differential equations. Validity of Series solution of Differential		<b>(5+5) hours</b>



equations.

**MATLAB:** application of differential equations

**Text Books :**

1. Early Transcendental Calculus- James Stewart, Thomson Books, 7ed 2010

**Reference Books:**

1. Calculus Single and Multivariable, Hughues-Hallett Gleason, Wiley India Ed, 4ed, 2009.
2. Thomas Calculus, George B Thomas, Pearson India, 12ed, 2010



**SECOND SEMESTER B E PROGRAM 2019-20**  
**Mechanical Science Stream Syllabi Content**

<b>Course Code: 15EPHB102</b>		<b>Course Title: <b>Engineering Physics</b></b>	
<b>L-T-P-S: 3-0-0</b>		<b>Credits: 3</b>	<b>Contact Hrs.: 03 Hrs./Week</b>
<b>ISA Marks: 50</b>		<b>ESA Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching Hrs. 40 Hrs.</b>		<b>Exam Duration:3 Hrs.</b>	
<b>Unit I</b>			
Chapter 1	<b>Concept of Motion - Kinematics in One Dimension</b> Introduction, Motion Diagrams, The Particle Model, Position Model, Linear Velocity and Acceleration, Uniform Motion, Instantaneous Velocity, Finding Position from Velocity, Motion with Constant Acceleration, Free Fall Motion on an Inclined Plan, Instantaneous Acceleration, Numericals.		<b>6 hours</b>
Chapter 2	<b>Kinematics in Two Dimensions</b> Introduction to Vectors, Properties of vectors, Coordinate Systems and Vector Components, Vector Algebra. Position, velocity and Acceleration vectors, Projectile Motion, Relative Motion, Uniform Circular Motion, Velocity and Acceleration in Uniform Circular Motion, Nonuniform Circular Motion and Angular Acceleration, Numericals.		<b>6 hours</b>
Chapter 3	<b>Force and Motion</b> Concept of Force, Identifying Forces, A Virtual Experiment, Newton's First Law, Newton's Second Law, Free-Body Diagrams, Applications.		<b>4 hours</b>
<b>Unit II</b>			
Chapter 4	<b>Dynamics I</b> Equilibrium using Newton's second Law, Friction, Drag, Newton's Third Law, Analyzing Interacting Objects, Newton's Third Law, Applications.		<b>5 hours</b>
Chapter 5	<b>Dynamics II</b> Motion in a plane, Dynamics in Two Dimension, Velocity and Acceleration in Uniform Circular Motion, Dynamics of Uniform Circular Motion, Fictitious Forces, Non-uniform Circular Motion, Numerical.		<b>6 hours</b>
Chapter 6	<b>Impulse and Momentum</b>		<b>5 hours</b>



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	Momentum and Impulse, Problems, Conservation of Momentum, Inelastic Collisions, Explosion, Momentum in Two Dimension, Numericals.	
<b>UNIT III</b>		
Chapter 7	<b>Energy and Work</b> Energy: Kinetic Energy and Gravitational Potential Energy, Restoring Forces, Hooke's Law, Elastic Potential Energy, Elastic Collisions, Energy Diagrams, Work: Work and Kinetic Energy, Force, Work and Potential energy, Conservation of Energy, Power, Numericals.	<b>8 Hours</b>

**Text Book:**

1. John W Jewett and Raymond A Serway, Physics for Scientists and Engineers with modern physics,, Cengage publication, India Edition, 8<sup>th</sup> Edition.

**Reference:**

1. Randall D Knight, Physics for Scientists and Engineers, Pearson publication, 2<sup>nd</sup> Edition.
2. Hans C Ohanian and John T Markert, Physics for Engineers and Scientists, W W Norton and Company, Volume 1, 3<sup>rd</sup> Edition



**SECOND SEMESTER B E PROGRAM 2019-20**  
**Mechanical Science Stream Syllabi Content**

<b>Course Code: 15ECVF102</b>		<b>Course Title: <b>Engineering Mechanics</b></b>	
<b>L-T-P-SS: 4-0-0</b>		<b>Credits: 4</b>	<b>Contact Hrs./Week: 4</b>
<b>ISA Marks: 50</b>		<b>ESA Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching Hrs.: 50</b>		<b>Exam Duration: 3 hours</b>	
Unit I			
No	Content	Hrs.	
1	<p><b>Chapter 1: Overview of Civil Engineering</b>  <b>Evolution of Civil Engineering</b>  Specialization, scope and role.  <b>Impact of Civil Engineering on</b>  National economy, environment and social &amp; cultural fabric.  <b>Challenges and Opportunities for Civil Engineers</b>  Civil Engineering Marvels, Future challenges, Higher education and Research.</p>	04	
2	<p><b>Chapter 2: Coplanar concurrent force system</b>  <b>Introduction to Engineering Mechanics:</b>  Basic idealizations – Particle, Continuum, Body, Rigid body, Deformable body, Definition of force and its elements; Laws of Mechanics – Parallelogram law of forces, Principle of transmissibility, Law of Superposition, Newton’s laws of motion. Classification of force systems <span style="float: right;">3 hrs.</span></p> <p><b>Resultant of coplanar concurrent force system:</b> Definitions – Resultant, composition &amp; Resolution of a force, Equilibrium, Equilibrant, Formulae for resultant of forces and resolution of a force. Numerical problems on resultant of forces. <span style="float: right;">4 hrs.</span></p> <p><b>Equilibrium of coplanar concurrent force system:</b>  Conditions of equilibrium, Action &amp; Reaction, Free body diagram, Lamis’ theorem. Numerical problems on equilibrium of forces. <span style="float: right;">5 hrs.</span></p>	12	
3	<p><b>Chapter 3: Coplanar non-concurrent force system</b>  <b>Resultant of a force system:</b> Moment, moment of a force, couple, moment of a couple, Characteristics of couple, Equivalent force-couple system, Numerical problems on moment of forces and couples, on equivalent force-couple system. Varignons principle of moments, Resultant of coplanar- non-</p>	05	



	concurrent force systems and numerical problems.	5 hrs.	
Unit II			
4	<b>Chapter 4: Equilibrium of a force system (Chapter 3 contd..)</b> Conditions of equilibrium, types of support and loading for a statically determinate beam, Reactions at support connections, Numerical problems on equilibrium of force systems and support reactions for a statically determinate beam. 5 hrs.		18
5	<b>Chapter 5: Static Friction</b> Introduction, types of friction, definition, limiting friction, coefficient of friction, laws of Coulomb friction, angle of friction and angle of repose, cone of friction. Wedge and belt friction theory. Derivation of belt friction formula. Numerical problems on, impending motion on horizontal and inclined planes (including connected bodies); wedge friction; Ladder friction and Belt friction. 8 hrs.		
6	<b>Chapter 6: Centroid of Plane Figures</b> Introduction, Definition, Methods of determining the centroid, axis of reference, axis of symmetry, Locating the centroid of simple plane figures (triangle, semicircle, quarter of a circle and sector of a circle etc..) using method of integration, Numerical problems on Centroid of simple built up sections. 5 hrs.		
Unit – III			
7	<b>Chapter 7: Second moment of area (Plane figures)</b> Introduction, Definition, Method of determining the second moment of area, Section Modulus, Radius of gyration, perpendicular and Parallel axis theorems, Polar second moment of area, second moment of area of simple plane figures (triangle, rectangle, semicircle, circle etc..) using method of integration, Numerical problems on MI of simple built up sections. 5 hrs..		11
8	<b>Chapter 8: Kinetics of a particle- Work, Power, Energy</b> Introduction – Kinematics and Kinetics, Definitions – work, power and energy. Work done by a force (constant, gravitational and spring forces) in rectilinear motion. Numerical problems, Kinetic energy of a particle, principle of work and energy. 6 hrs.		
<b>Text Book:</b>			
1. Beer, F.P. and Johnston, R., Mechanics for Engineers: Statics, McGraw Hill Company, New York, 1988.			
2. Bhavikatti, S.S., and Rajasshekarappa K.G., Engineering Mechanics, 3Ed., New Age			



*International Pub. Pvt. Ltd., New Delhi, 2008.*

3. *Kumar, K.L., Engineering Mechanics, 3ed., Tata McGraw Hill Publishing Company, New Delhi, 2003.*
4. *Punmia, B.C., Jain, A. and Jain, A., Mechanics of Materials, Lakshmi Publications, New Delhi, 2006*

**References:**

1. Jagadeesh, T.R. and Jayaram, *Elements of Civil Engineering*, Sapna Book House, Bangalore, 2006.
1. Ramamrutham, S., *Engineering Mechanics*, Dhanpat Rai Publishing Co., New Delhi, 1998.
2. Singer, F.L., *Engineering Mechanics*, 3<sup>rd</sup> edition Harper Collins, 1994.
3. Timoshenko, S.P. and Young, D.H., *Engineering Mechanics*, 4<sup>th</sup> edition, McGraw Hill Publishing Company, New Delhi, 1956.
4. Irving H Shames, *Engineering Mechanics*, 3<sup>rd</sup> edition, Prentice-Hall of India Pvt. Ltd, New Delhi- 110 001, 1995.



**SECOND SEMESTER B E PROGRAM 2019-20**  
**Mechanical Science Stream Syllabi Content**

<b>Program: UG</b>		
<b>Course Code: 15EMEP101</b>	<b>Course Title: <b>Computer Aided Engineering Drawing</b></b>	
<b>L-T-P-SS: 0-0-3</b>	<b>Credits: 3</b>	<b>Contact Hrs./Week: 6</b>
<b>ISA Marks: 80</b>	<b>ESA Marks: 20</b>	<b>Total Marks: 100</b>
<b>Teaching Hrs.: 50</b>	<b>Exam Duration: 3 hours</b>	
<b>I. No</b>	<b>Content</b>	<b>No. of Sessions</b>
<b>01</b>	<b>Chapter 01: Introduction to engineering drawing and orthographic projections. ( Manual Drafting )</b>  i) Introduction to engineering drawing – BIS conventions. ii) Orthographic projections: first angle projection and third angle projection – symbolic representation. iii) Projections of points. iv) Projections of lines inclined to both the planes and determination of true length by rotating the view method (Problems on traces of a line and mid-point problems are not included). However application problems are included. v) Projection of planes: Planes parallel to one plane and perpendicular to other plane or perpendicular to one plane and inclined to other plane (Two stage problems). vi) Projection of simple solids such as prisms, pyramids, cylinders, cones and sphere and their frustums in simple positions (Base parallel to or in one of the three planes).	<b>08</b>
<b>02</b>	<b>Chapter 02: Development of lateral surfaces of solids. (MANUAL)</b>  i) Development of lateral surface of prisms and cylinders (Either full or truncated using parallel line development method) ii) Development of lateral surface of pyramids and cones (Either full or truncated or of their frustums using radial line development method) iii) Development of lateral surfaces of spheres using both the methods and development of transition pieces.	<b>07</b>



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<b>03</b>	<b>Chapter 03: Conversion of pictorial views into orthographic projections using CAD software.</b> Drawing orthographic projection of objects shown in pictorial views by first angle method of projection using CAD software. (2D drafting only)	<b>06</b>
<b>04</b>	<b>Chapter 04: Isometric projection or view using CAD software.</b> Drawing isometric projections or views of objects shown in orthographic projections using CAD software.	<b>04</b>

**Text Books:**

1. Text Book of Engineering Drawing by K R Gopalakrishna
2. Text Book of Engineering Drawing by N D Bhatt and V M Panchal



**SECOND SEMESTER B E PROGRAM 2019-20**  
**Mechanical Science Stream Syllabi Content**

<b>Program: UG</b>		
<b>Course Code: 18EEEF102</b>	<b>Course Title: Basic Electrical Engineering</b>	
<b>L-T-P: 3-0-0</b>	<b>Credits: 3</b>	<b>Contact Hrs.: 40</b>
<b>CIA Marks: 50</b>	<b>ESA Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching:40 Hrs..</b>	<b>Exam Duration: 3 Hrs..</b>	

<b>Chapter No.</b>	<b>Unit-I</b>	<b>Hrs..</b>
1	<b>Overview of Electrical Engineering</b> Specialization, scope & role, impact of Electrical Engineering on national economy, environment, Sources of generation, sustainability, challenges and opportunities for electrical engineers, electrical engineering marvels, future challenges.	<b>02</b>
2	<b>DC Circuits</b> Voltage and current sources, Kirchoff's current and voltage laws, loop and nodal analysis of simple circuits with dc excitation. Time-domain analysis of first-order RL and RC circuits.	<b>05</b>
3	<b>AC Circuits</b> Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase series and parallel R-L-C ac circuits. Three-phase balanced circuits, voltage and current relations in star and delta connections. power measurement using two watt meters	<b>08</b>
	<b>Unit-II</b>	
4	<b>Electrical Actuators</b> Electromagnetic principles, Solenoid, Relays, classification of Electric motors, DC motors-shunt, series, compound, separately excited, PMDC motors – Speed Control, Stepper Motors, BLDC motors, three phase induction motor, Characteristics and applications, selection of motors for various applications.	<b>9</b>
5	<b>Power Electronics (Text1, chapter 45)</b> Introductory, Thyristor, Some thyristor circuits, Limitations to thyristor operation, The thyristor in practice, The fully controlled AC/DC converter, AC/DC inversion, Switching devices in inverters, Three-phase rectifier networks, The three-phase fully controlled converter, Inverter-fed induction motors, Soft-starting induction motors, DC to DC	<b>6</b>



	conversion switched-mode power	
	<b>Unit-III</b>	
6	<b>Electrical Wiring, Safety and protection(ref :Text3-page 1 to 10)</b> Types of wires and cables for internal wiring, Types of switches and Circuits, Types of wiring, Safety precautions and rules in handling electrical appliances, Electric shock, first aid for electrical shocks, Importance of grounding and earthing, Methods for earthing, Fuses, MCB, ELCB and Relays, Lockout and Tagout, Electrical Codes and Standards.	<b>05</b>
7	<b>Batteries:</b> Basics of lead acid batteries, Lithium Ion Battery , Battery storage capacity, Coulomb efficiency, Numerical of high and low charging rates, Battery sizing. Numericals..	<b>05</b>

<b>Text Books</b>	
1	Hughes, Electrical & Electronic Technology, 8th , Pearson Education, 2001
2	P C Sen, Principals of Electrical Machines and Power Electronics, 2nd, Wiley Publications
3	Gilbert M Masters, Renewable and efficient Electrical Power systems, Published by John Wiley & Sons 2004 edition
4	Frank D. Petruzella, Electric Motors and Control Systems, McGraw Hill Education Private Limited 2009 Edition
<b>Reference Books:</b>	
1	D C Kulshreshtha, Basic Electrical Engineering, Mc Graw Hill Publications
2	David G Alciatore and Michel B Hystand, Introduction to Mechatronics and Measurement Systems, 3rd, Tata McGraw Hill Education Private Limited, New Delhi., 2005
3	Vincent Del Toro, Electrical Engineering Fundamentals, 2 <sup>nd</sup> edition Prentice Hall India



**SECOND SEMESTER B E PROGRAM 2019-20**  
**Mechanical Science Stream Syllabi Content**

<b>Course Code: 15EHSP101</b>	<b>Course Title: Social Innovation</b>	
<b>L-T-P-Self Study: 0-1-1</b>	<b>Credits: 2</b>	<b>Contact Hrs.: 28</b>
<b>ESA Marks: 80</b>	<b>ISA Marks: 20</b>	<b>Total Marks: 100</b>
<b>Teaching Hrs.: 28</b>		<b>Exam Duration: 3 hrs.</b>



Module	Topics	Assignments	Support activities / Tools	
KNOWLEDGE, TOOLS & DEVELOPMENT	Course sensitization	<p>1. Introduction to Social Innovation:</p> <ul style="list-style-type: none"> <li>Awakening social consciousness (<a href="http://www.yourstory.com">www.yourstory.com</a>)</li> <li>Social Innovation and Leadership</li> <li>Engineering &amp; Social innovation (EPICS) (<a href="#">Connecting SI Course to Mini Project, Capstone Project, Campus Placements</a>)</li> <li>Course Overview</li> <li><b>Students' Self Introduction Activity</b></li> <li>Group formation <b>Activity</b></li> </ul>	<p><b>Reading assignments</b></p> <ul style="list-style-type: none"> <li>Read the handout on "The Process of Social Innovation" by Geoff Mulgan</li> <li>Design thinking for Social Innovation</li> </ul> <p><b>Written Assignments</b></p> <ul style="list-style-type: none"> <li>Writing about Akshaya Patra in class. (<a href="#">Background information about Akshaya patra and the Social Cause it is addressing</a>)</li> <li>Brainstorming Session on Social Innovators in Class</li> </ul>	<ul style="list-style-type: none"> <li>Class activity on Behavioral Blocks to Innovation <a href="#">Discussion on the behavioural blocks.</a></li> <li><b>Introducing oneself with three Adjectives- Appreciating diversity and discovering self</b></li> <li><b>Group Formation Activity (Forming square)</b> (<a href="#">Making four equilateral triangles out of popsicle sticks to enhance group cohesiveness amongst the group mates</a>)</li> </ul>
	Create Mindsets	<p><b>Seven Mindsets:</b></p> <ol style="list-style-type: none"> <li>Empathy (<a href="#">Example of The Boy and the Puppies</a>)</li> <li>Optimism (<a href="#">Person Paralyzed waist down / Glass Half full Half Empty</a>)</li> <li>Iteration (<a href="#">Thomas Alva Edison</a>)</li> <li>Creative Confidence (<a href="#">Origami – Josef Albers</a>)</li> <li>Making it</li> <li>Embracing Ambiguity (<a href="#">Confusion is the Welcome doormat at the door of Creativity</a>)</li> <li>Learning from Failure (<a href="#">Designing Website first and then asking the stakeholders about the website</a>) (<a href="#">Spending one lakh for the business which is never launched</a>)</li> </ol>	<p><b>Reading assignments</b></p> <ul style="list-style-type: none"> <li>Handout on "Create Mindsets"</li> </ul>	<ul style="list-style-type: none"> <li>(<a href="#">How to train the Dragon? Common Video for all the mindsets</a>)</li> <li>Watching in Class TED Talk on "How to build your Creative Confidence by David Kelley – IDEO Founder)</li> </ul>
	Process of Social Innovation	<p><b>Engage</b></p> <p>Community study and Issue Identification</p>	<p><b>Reading assignments</b></p> <ul style="list-style-type: none"> <li>Handout on Community Study and Issue Identification</li> <li>Case Study on "EGramSeva"</li> <li>Case Study on "Janani Agri Serve"</li> </ul>	<ul style="list-style-type: none"> <li>Activity on Observation skills To know how to use one's observation skills in understanding the social conditions</li> <li>Experience sharing by senior</li> </ul>





			<p><u><b>Class Presentations</b></u></p> <ul style="list-style-type: none"> <li>Initial observations being made by the group</li> </ul> <p>( Literature Survey of Places of Hubli- Dharwad)</p> <p><a href="http://www.readwhere.com">www.readwhere.com</a></p> <ul style="list-style-type: none"> <li>Detailed interaction / engagements with the society and finalize the social issue for intervention</li> </ul> <p><b>Use template 1: Frame your Design Challenge</b></p>	<p>students</p> <ul style="list-style-type: none"> <li>Brainstorming Deliberations on the initial observations and arrive at the "Social Issue"</li> <li>Familiarization of the respective templates with the help of sample case study</li> </ul>
<b>PEER REVIEW</b>				
		<p><b>2. Inspiration</b></p> <ul style="list-style-type: none"> <li>Plan for the Research</li> <li>Development of Interview guide</li> <li>Capture your Learnings</li> </ul>	<p><u><b>Reading assignments</b></u></p> <ul style="list-style-type: none"> <li>Handout on Overview of Inspiration</li> </ul> <p><u><b>Class Presentations</b></u></p> <ul style="list-style-type: none"> <li>Entirety of the Social Issue</li> <li>Identification of the Stake Holders</li> </ul> <p>(Examples on Fluorescent Curtain and Students' Punctuality for Class)</p> <ul style="list-style-type: none"> <li>Interview Questions</li> </ul> <p>(Role Play on Interview with Stakeholders)</p> <ul style="list-style-type: none"> <li>Category wise Learnings capture</li> </ul> <p><b>Use template 2: Plan your Research</b></p> <p><b>Template 3. Development of Interview Guide</b></p> <p><b>Template 4. Capture your Learning</b></p>	<ul style="list-style-type: none"> <li>Familiarization of the respective templates with the help of sample case study</li> </ul>
		<p><b>3. Ideation</b> <b>3.1 Synthesis</b></p> <ul style="list-style-type: none"> <li>Search for meaning</li> <li>Create "How might we"</li> </ul>	<p><u><b>Reading assignments</b></u></p> <ul style="list-style-type: none"> <li>Handout on Overview of Ideation-Synthesis</li> </ul>	<ul style="list-style-type: none"> <li>Familiarization of the respective templates with the help of sample case study</li> </ul>



		<p>question</p>	<p><u><b>Class Presentations</b></u></p> <ul style="list-style-type: none"> <li>• Create insights</li> <li>• “How might we” questions</li> </ul> <p><b>Use template 5: Create Insights</b></p> <p><b>Template 6: Create “How Might We’ Questions</b></p>	
<b>PEER REVIEW</b>				
		<p><b>3.0 Ideation</b></p> <p><b>3.2 Prototyping</b></p> <ul style="list-style-type: none"> <li>• Generate Ideas</li> <li>• Select Promising Ideas</li> <li>• Determine what to prototype</li> <li>• Make your prototype</li> <li>• Test and get feedback</li> </ul>	<p><u><b>Reading assignments</b></u></p> <ul style="list-style-type: none"> <li>• Handout on Overview of Ideation-Prototyping</li> </ul> <p><u><b>Class Presentations</b></u></p> <ul style="list-style-type: none"> <li>• Story board-demonstrating the possible solutions</li> </ul> <p><b>Use template 7: Select your best ideas</b></p> <p><b>Template 8 : Determine what to prototype</b></p>	<ul style="list-style-type: none"> <li>• Brain storming</li> <li>• Familiarization of the respective templates with the help of sample case study</li> <li>• Activity on Risk management</li> <li>• Activity on Resource management</li> </ul> <p>Structure building games</p>
		<p><b>4.0 Implementation</b></p> <ul style="list-style-type: none"> <li>• Create an action plan</li> <li>• Community Partners</li> </ul> <p>(if any)</p> <ul style="list-style-type: none"> <li>• Budgeting &amp; Fundraising</li> </ul> <ol style="list-style-type: none"> <li>1. <b>Peer to Peer</b></li> <li>2. <b>Crowd Funding</b></li> <li>3. <b>Giving Kiosks</b></li> <li>4. <b>Donation</b></li> <li>5. <b>Envelop Funding</b></li> <li>6. <b>Marathons/ Walkathons</b></li> <li>7. <b>Conducting Yoga Classes</b></li> </ol> <p>( <a href="http://www.causevox.com">www.causevox.com</a> / <a href="http://www.blog.fundly.com">www.blog.fundly.com</a> )</p> <ul style="list-style-type: none"> <li>• Duration</li> <li>• Ethical concerns</li> <li>• Launch your solution</li> <li>• Feedback (Impact)</li> </ul>	<p><u><b>Reading assignments</b></u></p> <ul style="list-style-type: none"> <li>• Handout on Overview of Implementation</li> </ul> <p><u><b>Class Presentations</b></u></p> <ul style="list-style-type: none"> <li>• Pilot implementation plan with required resources and Budget indicating stake holders &amp; their enagement</li> </ul>	<ul style="list-style-type: none"> <li>• Familiarization of the respective templates with the help of sample case study</li> </ul>



		<b>5.0 Reflect</b>  Reflection of the overall learning by the students	<b><u>Reading assignments</u></b>  • Handout on Overview of students Reflection <b>Use template 9: Reflection on the Process</b>  <b><u>Class Presentations</u></b>  Final Presentation- After Implementation	<ul style="list-style-type: none"><li>• Familiarization of the respective templates with the help of sample case study</li></ul>



**SECOND SEMESTER B E PROGRAM 2019-20**  
**Mechanical Science Stream Syllabi Content**

<b>Program: UG</b>		
<b>Course Code: 16EPHP102</b>	<b>Course Title: Engineering Physics lab</b>	
<b>L-T-P-SS:0-0-1</b>	<b>Credits : 1</b>	<b>Contact Hrs.: 02 Hrs./Week</b>
<b>ISA Marks: 80</b>	<b>ESA Marks: 20</b>	<b>Total Marks: 100</b>
<b>Teaching Hrs.: 24 Hrs.</b>		<b>Examination Duration: 3 Hrs.</b>
<b>Experiments</b>		
1.	Experimental Data Error Analysis	
2.	Coefficient of Friction	
3.	Centripetal Force	
4.	Young's Modulus by Searle's method	
5.	The Law of Forces by three wire suspension table	
6.	Force Table and Vector addition of forces	
7.	Moment of inertia and rotational motion	
8.	Projectile motion	
9.	Variable g pendulum	
10.	Study of one dimension motion by linear air track	

**SECOND SEMESTER B E PROGRAM 2019-20**  
**Electrical Science Stream Syllabi Content**

<b>Program: UG</b>		
<b>Course Title: Multivariable calculus</b>		<b>Course Code: 18EMAB102</b>
<b>L-T-P: 4-1-0</b>	<b>Credits: 05</b>	<b>Contact Hours: 50</b>
<b>ISA Marks: 50</b>	<b>ESA Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching Hours: 05</b>	<b>Examination Duration: 3hrs.</b>	
<b>Unit I</b>		
<b>1. Partial differentiation</b> Function of several variables, Partial derivatives, Level curves, Chain rule, Errors and Approximations. Extreme value problems. Lagrange's multipliers.		<b>12 hours</b>
<b>2. Double integrals</b> Double integrals- Rectangular and polar coordinates, Change the order of integration. Change of variables, Jacobian. Application of double integrals <b>MATLAB:</b> optimization problems, application of double integrals		<b>08 hours</b>
<b>Unit II</b>		
<b>3. Triple integrals</b> Triple integrals, Cartesian, change to Cylindrical and Spherical coordinates Application of Triple integrals		<b>07 hours</b>
<b>4. Calculus of Vector Fields</b> Vector fields, Gradient and directional derivatives. Line and Surface integrals. Independence of path and potential functions. Green's theorem, Divergence of vector field, Divergence theorem, Curl of vector field. Stokes theorem. <b>MATLAB:</b> application of Triple integrals, Vector calculus problems		<b>13 hours</b>
<b>Unit III</b>		
<b>5. Differential equations of higher orders</b> (a) Linear differential equations of second and higher order with constant coefficients The method of Variation of parameters. Initial and boundary value problems. (b) Applications of second order differential equations-Newton's 2 <sup>nd</sup> law, electrical circuits, Simple Harmonic motion. Series solution of differential equations. Validity of Series solution of Differential		<b>(5+5) hours</b>



equations.

**MATLAB:** application of differential equations

**Text Books :**

2. Early Transcendental Calculus- James Stewart, Thomson Books, 7ed 2010

**Reference Books:**

3. Calculus Single and Multivariable, Hughues-Hallett Gleason, Wiley India Ed, 4ed, 2009.
4. Thomas Calculus, George B Thomas, Pearson India, 12ed, 2010

**SECOND SEMESTER B E PROGRAM 2019-20**  
**Electrical Science Stream Syllabi Content**

<b>Program: UG</b>		
<b>Course Title: Engineering Chemistry</b>		<b>Course Code: 15ECHB102</b>
<b>L-T-P: 3-0-0</b>	<b>Credits: 03</b>	<b>Contact Hours: 40</b>
<b>ISA Marks: 50</b>	<b>ESA Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching Hours: 03</b>	<b>Examination 3hrs.</b>	<b>Duration:</b>
<b>Unit – I</b>		
<p><b>1. Chemical Bonding</b> Introduction, Ionic bond, factors influencing the formation of ionic bond: Ionization energy. Electron affinity &amp; electro negativity and properties of ionic compounds. Covalent bond: Valence Bond theory &amp; Molecular Orbital theory – formation of hydrogen molecule, factors influencing the formation of covalent bond, polar and non-polar covalent bond, dipole moment, problems on calculation of percentage of ionic character and properties of covalent compounds, Co-ordinate bond: formation of hydronium ion and ammonium ion.</p> <p align="right"><b>04 hrs.</b></p>		
<p><b>2. Electrochemical Energy Systems</b> Electrode potential, Nernst equation, formation of a cell; Reference electrodes – Calomel electrode, Determination of electrode potential, numerical problems on <math>E</math>, <math>E_{cell}</math> &amp; <math>E^0_{cell}</math>. Batteries: Classification, Characteristics, Lead - acid, Lithium ion battery. Fuel cells - Methanol-<math>O_2</math> fuel cell.</p> <p align="right"><b>06 hrs.</b></p>		
<p><b>3. Polymers</b> Introduction, polymerization ; mechanism of polymerization taking ethylene as an example. Determination of molecular weight of a polymer – numerical problems. Commercial polymers - Plexi glass, PS, polyurethane. Polymer composites: Carbon fiber and Epoxy resin – synthesis, properties and applications. Introduction to conducting polymers, mechanism of conduction in poly acetylene and applications.</p> <p align="right"><b>06 hrs.</b></p>		

### Unit – II

#### 4. Plating Techniques

Introduction, technological importance. Electroplating, Principles of electroplating. Factors affecting nature of electrodeposit, throwing power, Numerical problems on throwing power, Electroplating process of gold by acid cyanide bath. Electro less plating, advantages of electro less plating over electroplating. Electro less plating of Cu and its application in the manufacture of PCB.

**04 hrs.**

#### 5. Wafer Technology

Introduction, physical and chemical properties of silicon. Purification of silicon; chemical vapor deposition (CVD) process, zone refining process. Crystal growth; preparation of single crystal silicon by Czochralski crystal pulling technique – numerical problems. Crystal slicing and wafer preparation.

Fabrication process: thermal oxidation, diffusion, ion implantation – numerical problems, epitaxial growth, masking and photolithography, wet etching, dry etching.

**09 hrs.**

#### 6. Material Chemistry

Liquid Crystals – Types of liquid crystals, applications of Liquid Crystal in Display system.

Fluorescence and Phosphorescence – Jablonski diagram, Thermoelectric and Piezoelectric materials – meaning, properties and applications.

**03 hrs.**

### Unit – III

#### 7. Instrumental methods of measurement

Advantages over conventional methods. Electro analytical methods: Potentiometer - principle, methodology and applications. Optoanalytical methods: Colorimeter - Principle, methodology and applications.

Spectral methods of analysis : UV – Spectrophotometer - Instrumentation and applications.

**04 hrs.**

#### 8. Environmental Chemistry:

Water: Sources and ill effects of water pollutants – fluoride and nitrate; determination of total hardness of water by EDTA method – numerical problems. ,

Sewage: Determination of Biological Oxygen Demand by Winkler's method – numerical problems and determination of Chemical Oxygen Demand – numerical problems.

**04 hrs.**



**Text Books:**

1. A text Book of Engineering Chemistry, 1st edition, Dara. S. S, S. Chand & Co. Ltd., 2009, New Delhi.
2. A text Book of Engineering Chemistry, 16th edition, Jain P.C and Jain M, Dhanpat Rai Publications, 2006, New Delhi.

**Reference Books**

1. Text book of Inorganic Chemistry, P.L.Soni, Sultan Chand, 1999, New Delhi.
2. Hand book of batteries, David Linden, Thomas B Reddy, 3rd edition Mc Graw Hill publications, 2001, New York.
3. Polymer Science, 6<sup>th</sup> Edition, Gowariker V.R., Viswanathan N.V., Sreedhar J., New Age International (P) Ltd, 2007, New Delhi.
4. Solid State Devices & Technology, 4th Edition, V.Suresh Babu, sanguine Technical Publishers, 2005, Bangalore.
5. Material Science & Engineering: An Introduction, 9<sup>th</sup> Edition, Calister William D, John Wiley and sons, 2007, New York.
6. Instrumental methods of Chemical analysis, 5<sup>th</sup> Edition, Gurudeep R Chatwal, Shan K Anand, Himalaya Publishing House Pvt. Ltd, 2010, Mumbai.
7. VLSI Technology, 2<sup>nd</sup> Edition, S.M.Sze, McGraw Hill Series in electrical and computer engineering, 1998, New York.



**SECOND SEMESTER B E PROGRAM 2019-20**

**Electrical Science Stream Syllabi Content**

Program: <b>UG</b>		
Course Title: <b>Problem Solving with Data Structures</b>		Course Code: <b>18ECSP102</b>
L-T-P: <b>0-0-3</b>	Credits: <b>3</b>	Contact : <b>6 Hrs./week</b>
ISA Marks: <b>80</b>	ESA Marks: <b>20</b>	Total Marks: <b>100</b>
Teaching : <b>78 Hrs..</b>	Exam Duration: <b>3 Hrs..</b>	

<b>1</b>	<b>Pointers, Structures and Files</b> Recap of basics: Pointers ,Structures; Self-referential structures, dynamic memory management Files – File manipulation programs	<b>12 hrs.</b>
<b>2</b>	<b>Stacks and Recursion</b> Stack: Definition, Operations, Stack ADT Implementation of stack operations. Applications of stack. Recursion- Need for Recursion and problems on Recursion.	<b>16 hrs.</b>
<b>3</b>	<b>Queues</b> Queue: Definitions of Linear, Circular queues, Queue ADT Linear and circular queue operations Definition and working of Priority queue, Double ended queue; Applications of queues.	<b>16 hrs.</b>
<b>4</b>	<b>Lists</b> Concept of lists and dynamic memory management lists, definitions and representations: singly, doubly, circular lists. Dynamic Implementation of lists and its operations, Applications of linked lists	<b>18 hrs.</b>
<b>5</b>	<b>Binary trees</b> Binary Tree: Definition, Terminology and representation, Tree Traversals	<b>16 hrs.</b>



	both recursive and iterative. Binary Search Tree and its applications.	
<b>Text Books</b>		
<ol style="list-style-type: none"><li>1. Data Structures with C -- Seymour Lipschutz, Schaum's Outline Series</li><li>2. Data Structures Using C and C++ -- Langsam and Tanenbaum, PHI Publication</li><li>3. Data Structures Through C -- Yashavant P Kanetkar, BPB Publication</li></ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"><li>1. Data Structures, Algorithms and Applications In C++ -- Satraj Sahani</li><li>2. Data Structures and Algorithms Made Easy – Narshiman Karumunchi, Career Monk</li></ol>		



**SECOND SEMESTER B E PROGRAM 2019-20**

**Electrical Science Stream Syllabi Content**

<b>Program: UG</b>		
Course Code: <b>15ECRP101</b>	Course Title: <b>Engineering Exploration</b>	
L-T-P: <b>0-0-3</b>	Credits: 3	Contact Hrs.: 78
ISA Marks: 80	ESA Marks: 20	Total Marks: 100
Teaching Hrs.: 78		ESA Exam Duration: 3 hrs.

No	Content	Sessions
1	Introduction to Engineering and Engineering Study	1
2	Role of Analysis in Engineering, Analysis Methodology	2
3	Data Analysis Graphing	2
4	Basics of Engineering Design, Multidisciplinary Nature of Engineering Design	5
5	Project Management	1
6	Sustainability in Engineering	2
7	Ethics	1
8	Modeling, Simulation and Data Acquisition using Software Tool	1
9	Platform based development : Arduino	3
9	Course Project	3

**Reference Books:**

1. Engineering Fundamentals & Problem Solving by Arvid Eide, Roland Jenison, Larry Northup, Steven, Mc GrawHill Higher Education, 6<sup>th</sup> Edition ( 2011)
2. Engineering Exploration ( Edited Book, 2008) by Pearson Publication

**Evaluation Scheme**

Chapter No	Name	Weightage in percentage
1	Introduction to Engineering and Engineering Study	-
2	Role of Analysis in Engineering	10
3	Analysis Methodology	
4	Data Analysis Graphing	10



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5	Basics of Engineering Design	20
	Multidisciplinary Nature of Engineering Design	
6	Project Management	5
7	Sustainability in Engineering	10
8	Ethics	5
9	Modelling, Simulation and Data Acquisition using Software Tool	-
10	Platform Based Development: Arduino	-
10	Course Project	40



**SECOND SEMESTER B E PROGRAM 2019-20**  
**Electrical Science Stream Syllabi Content**

<b>Program: UG</b>			
<b>Course Title: Basic Electronics</b>			<b>Course Code: 18EECF101</b>
<b>L-T-P: 4-0-0</b>	<b>Credits: 4</b>	<b>Contact Hours: 4 Hrs./week</b>	
<b>ISA Marks: 50</b>		<b>ESA Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching Hours: 50Hrs.</b>		<b>Examination Duration: 3 Hrs..</b>	

Unit 1	Hours
<b>Chapter 1: Trends in Electronic Industries:</b> Introduction, Roadmap of electronic sector, scope and opportunities in various segments of electronics (i.e., Consumer, Telecom, IT, Defense, Industrial, Medical and Automobiles), Government and private sectors, Growth profile of Electronic industries, Standards and PolISAs, Electronic System Components.	<b>03</b>
<b>Chapter 2: Basic Components, Devices and Applications:</b> Diode: PN junction characteristics; modeling as a circuit element, ideal and practical diode. AC to DC converter: Half wave and full wave rectifier (centre tap and bridge), capacitor filter and its analysis, numerical examples. Zener diode and its applications (Voltage reference and voltage regulator). Realization of simple logic gates like AND and OR gates.	<b>10</b>
<b>Chapter 3: Transistor:</b> BJT, transistor voltages and currents, Signal amplifier (Fixed bias, Collector base bias, Voltage divider bias, CE configuration). DC load line. Voltage, current and power gains. Transistor as a switch: NOT Gate, Basic (DTL) NAND gate. Transistor as a Small Signal Amplifier (Single Stage and Two Stage RC-coupled Amplifier).	<b>07</b>
Unit 2	
<b>Chapter 4: Digital Logic:</b> Number systems: Decimal, Binary, Octal and Hexadecimal number systems, Conversions, Binary Operations-Addition and subtraction in binary number systems. Logic gates: Realization of simple logic functions using basic gates (AND, OR, NOT), Realization using universal gates (NAND, NOR). Boolean algebra: Theorems and postulates, DeMorgan's Theorems, simplification of logical expressions, Karnaugh Maps, Use of Karnaugh Maps to Minimize Boolean Expressions (2 Variables, 3 Variables and 4 Variables), Design of Half Adder and Full Adder, Parallel Adder using full adders.	<b>14</b>
<b>Chapter 5: Operational Amplifier:</b> OPAMP characteristics (ideal and practical), Linear and non-linear applications: Inverting amplifier, Non inverting amplifier, Voltage	<b>06</b>



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follower, Integration, Differentiation, Adder, Subtractor, ZCD and Comparator.	
<b>Unit 3</b>	
<b>Chapter 6: Communication Systems:</b> Basic block diagram of communication system, types of modulation. Amplitude modulation: Time-Domain description, Frequency-Domain description. Generation of AM wave: square law modulator. Detection of AM waves: envelope detector. Double side band suppressed carrier modulation (DSBSC), Generation of DSBSC wave : balanced modulator, Super heterodyne principle.	<b>07</b>
<b>Chapter 7: Linear Power Supply, UPS &amp; CRO:</b> Working principle of linear power supply, UPS and CRO. Measurement of amplitude, frequency and phase of a given signal.	<b>03</b>

#### Text Book

1. David A Bell, Electronic devices and Circuits, PHI New Delhi, 2004
2. K.A Krishnamurthy and M.R.Raghuveer, Electrical, Electronics and Computer Engineering for SISAntist and Engineers, 2, New Age International Publishers, 2001
3. A.P. Malvino, Electronic Principles, Tata McGraw Hill, 1999

#### References

1. George Kennedy, Electronic Communication Systems, Tata McGraw Hill, 2000
2. Morris Mano, Digital logic and Computer design , 21st Indian print Prentice Hall India, 2000
3. Floyd, Digital fundamentals, 3, Prentice Hall India, 2001
4. BoylesteadNashelsky, Electronic devices & Circuit theory, Prentice Hall India, 2000
5. RamakantGaikawad , Operational Amplifiers & applications, PHI, 2000



**SECOND SEMESTER B E PROGRAM 2019-20**  
**Electrical Science Stream Syllabi Content**

<b>Program: UG</b>		
<b>Course code: 15EECF101</b>	<b>Course Title: Basic Mechanical Engineering</b>	
<b>L-T-P: 2-1-0</b>	<b>Credits: 3</b>	<b>Contact Hrs.: 4</b>
<b>ISA Marks: 50</b>	<b>ESA Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching Hrs.: 50</b>		<b>Exam Duration: 3 hrs.</b>

Chapter	Contents	Hours	Tutorial	Sessions
<b>UNIT I</b>				
1	<b>Introduction to Mechanical Engineering:</b> Definition of engineering, Mechanical Engineering, Branches of Mechanical Engineering, Who are Mechanical Engineers?, Mechanical Engineers' top ten achievements.	2	Visit to Workshop and Machine Shop, Tools, Safety Precautions Video presentations	1
2	<b>Manufacturing Engineering: Basics of Manufacturing</b> What is manufacturing?, The main manufacturing sectors, The importance of the main manufacturing sectors to the Indian economy, Scales of production Classification of manufacturing Processes. Advances in Manufacturing: CNC machines, Mechatronics and applications	8	Demonstration on working of Lathe, milling, drilling, grinding machines Demonstration on Welding (Electric Arc Welding, Gas Welding, Soldering) Demonstration and Exercises on Sheet metal work. Visit to Learning Factory	5
<b>UNIT II</b>				
3	<b>Design Engineering: Power Transmission Elements</b> Overview Design Application: • Belt Drives. Types, Length of Belt. Velocity Ratio, Initial Tension. Ratio of Tensions.	6	Design Problems like <a href="#">a moving experience</a> , aluminium can crusher Video presentations	5





	Power Transmitted, Numerical Problems. <ul style="list-style-type: none"><li>Gears. Spur Gear, Rack and Pinion, Worm Gear, Bevel Gear, Helical Gears. Speed, Torque, and Power in Gear pair. Simple and Compound Gear trains. Numerical Problems.</li><li>Ball and Roller Bearings, Types, Applications.</li></ul>			
4	<b>Thermal Engineering 1: Prime Movers.</b> Internal Combustion Engines: Classification, IC engine parts, 2 stroke SI and CI engine, 4 Stroke SI and CI Engine, PV diagrams of Otto and Diesel cycles, Comparison of 2 stroke and 4 stroke engine, comparison of CI and SI engine, Problems on Engine Performance, Future trends in IC engines.	4	Case study on power requirement of a bike, car or any machine Video presentations	1
<b>UNIT III</b>				
5	<b>Thermal Engineering 2: Thermal Systems' Applications</b> Refrigeration system, Air conditioning system, Pumps, Blowers and Compressors, Turbines, and their working principle and specifications.	5	Case study on selection of various thermal systems Video presentations	1

**Text Books:**

- Jonathan Wickert and Kemper Lewis, An Introduction to Mechanical Engineering, Third Edition, 2013- Cengage Learning.4
- K.R.Gopalkrishna, SudhirGopalkrishna, S.C. Sharma. A Text Book of Elements of Mechanical Engineering, 30th Edition, Oct 2010,–Subhash Publishers, Bangalore.

**Reference Books:**

- Course Material developed by the Department of Mechanical Engineering.
- SKH Chowdhary, AKH Chowdhary, Nirjhar Roy, The Elements of Workshop Technology - Vol I & II , 11th edition 2001, Media Promoters and Publishers.
- Basic Manufacturing, Roger Timings, Third edition, Newnes, An imprint of Elsevier



**SECOND SEMESTER B E PROGRAM 2019-20**  
**Electrical Science Stream Syllabi Content**

<b>Course Code: 15EHS101</b>	<b>Course Title: Professional Communication</b>	
<b>L-T-P-Self Study: 1-1-0-0</b>	<b>Credits: 2</b>	<b>Contact Hrs.: 42</b>
<b>ESA Marks: 50</b>	<b>ISA Marks: 50</b>	<b>Total Marks: 100</b>
<b>Teaching Hrs.: 42</b>		<b>Exam Duration: 3 hrs.</b>

<b>Content</b>	<b>Hrs.</b>
<b>Chapter No. 1. Basics- English Communication</b> Course Introduction, Explanation of template mix-ups with correct usages & necessity of grammar in error detection, Usage of tenses	9 hrs.
<b>Chapter No. 2. Vocabulary and grammar</b> Vocabulary, Word Formation and Active and Passive Voice	6 hrs.
<b>Chapter No. 3. Bouncing Practice</b> Definition and types of bouncing and its practice with examples, reading skills, free style speech. Individual presentation.	6 hrs.
<b>Chapter No. 4. Rephrasing and Structures</b> Comprehension and Rephrasing, PNQ Paradigm and Structural practice	8 hrs.
<b>Chapter No. 5. Dialogues</b> Introduction of dialogues, Situational Role plays,	3 hrs.
<b>Chapter No. 6. Business Communication</b> Covering letter, formal letters, Construction of paragraphs on any given general topic.	9 hrs.



***Text Book:***

***References:***

**References:**

1. Collins Cobuild Advanced Learner's English Dictionary
2. Raymond Murphy - Intermediate English Grammar, Cambridge University Press
3. Martin Hewings- Advanced English Grammar, Cambridge University Press.