



Sri Devaraj Urs Educational Trust (R)

# R.L. JALAPPA INSTITUTE OF TECHNOLOGY

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DODDABALLAPUR - 561 203. BENGALURU RURAL DISTRICT, KARNATAKA.



| Department of Mechanical Engineering Course Outcome<br>Statements of AY-(2018-21) |  |
|---|--|
| Faculty: Mrs. Madhu N R   |  |
| Year/ Semester: 2 <sup>nd</sup> Year /3 <sup>rd</sup> Semester                    | Scheme of Study: 18-Scheme   |
| Course Name: TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES          | Course Code: 18MAT31   |
| CO1   | Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering. |
| CO2   | Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.         |
| CO3   | Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.                          |
| CO4   | Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.                              |
| CO5   | Determine the external of functional using calculus of variations and solve problems Arising in dynamics of rigid bodies and vibrational analysis.                           |

| Faculty: Dr. Kumaraswamy j                                     |  |
|--|--|
| Year/ Semester: 2 <sup>nd</sup> Year /3 <sup>rd</sup> Semester | Scheme of Study:18-Scheme  |
| Course Name: MECHANICS OF MATERIALS                            | Course Code: 18ME32  |
| CO1  | Understand simple, compound, thermal stresses and strains their relations and strain Energy. |
| CO2  | Analyse structural members for stresses, strains and deformations.                           |
| CO3  | Analyse the structural members subjected to bending and shear loads.                         |
| CO4  | Analyse shafts subjected to twisting loads.  |
| CO5  | Analyse the short columns for stability.   |

| Faculty: Lakshminarayan T H                                    |                           |
|--|---------------------------|
| Year/ Semester: 2 <sup>nd</sup> Year /3 <sup>rd</sup> Semester | Scheme of Study:18-Scheme |

  
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| Course Name: BASIC THERMODYNAMICS |   | Course Code: 18ME33 |
|-----------------------------------|---|---------------------|
| CO1                               | Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems.                           |                     |
| CO2                               | Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics   |                     |
| CO3                               | Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and apply 1st law of thermodynamics               |                     |
| CO4                               | Interpret the behavior of pure substances and its application in practical problems   |                     |
| CO5                               | Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations |                     |

| Faculty: Dr. Hanumanthe Gowda                                  |  |                           |
|--|--|---------------------------|
| Year/ Semester: 2 <sup>nd</sup> Year /3 <sup>rd</sup> Semester |  | Scheme of Study:18-Scheme |
| Course Name: MATERIAL SCIENCE                                  |  | Course Code: 18ME34       |
| CO1  | Understand the mechanical properties of metals and their alloys.   |                           |
| CO2  | Analyze the various modes of failure and understand the microstructures of ferrous and nonferrous materials.   |                           |
| CO3  | Describe the processes of heat treatment of various alloys   |                           |
| CO4  | Acquire the Knowledge of composite materials and their production process as well as applications.             |                           |
| CO5  | Understand the properties and potentialities of various materials available and material selection procedures. |                           |

| Faculty: Dr. Suchindra K R                                     |  |                           |
|--|--|---------------------------|
| Year/ Semester: 2 <sup>nd</sup> Year /3 <sup>rd</sup> Semester |  | Scheme of Study:18-Scheme |
| Course Name: METAL CUTTING AND FORMING                         |  | Course Code: 18ME35A      |

  
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| CO1 | Explain the construction & specification of various machine tools   |
| CO2 | Discuss different cutting tool materials, tool nomenclature & surface finish  |
| CO3 | Apply mechanics of machining process to evaluate machining time   |
| CO4 | Analyze tool wear mechanisms and equations to enhance tool life and minimize machining cost.  |
| CO5 | Understand the concepts of different metal forming processes and Apply the concepts of design of sheet metal dies to design different dies for simple sheet metal components. |

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|--|---|
| <b>Faculty: Dr. Kumarswamy J</b>                                   |   |
| <b>Year/ Semester: 2<sup>nd</sup> Year /3<sup>rd</sup>Semester</b> | <b>Scheme of Study: 18Scheme</b>  |
| <b>Course Name: COMPUTER AIDED MACHINE DRAWING</b>                 | <b>Course Code: 18ME36A</b>   |
| CO1  | Identify the national and international standards pertaining to machine drawing                                       |
| CO2  | Understand the importance of the linking functional and visualization aspects in the preparation of the part drawings |
| CO3  | Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies                            |
| CO4  | Interpret the Machining and surface finish symbols on the component drawings  |
| CO5  | Preparation of the part or assembly drawings as per the conventions   |

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| <b>Faculty: Dr. Lokesh Yadav B R</b>                               |                                  |
| <b>Year/ Semester: 2<sup>nd</sup> Year /3<sup>rd</sup>Semester</b> | <b>Scheme of Study:18-Scheme</b> |
| <b>Course Name: MATERIAL TESTING LAB</b>                           | <b>Course Code:18MEL37A</b>      |

  
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| CO1 | Acquire experimentation skills in the field of material testing  |
| CO2 | Develop theoretical understanding of the mechanical properties of materials by performing experiments. |
| CO3 | Apply the knowledge to analyse a material failure and determine the failure inducing agent/s.          |
| CO4 | Apply the knowledge of testing methods in related areas  |
| CO5 | Understand how to improve structure/behaviour of materials for various industrial applications         |

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|---|---|
| <b>Faculty: Dr. Suchindra K R</b>                                   |   |
| <b>Year/ Semester: 2<sup>nd</sup> Year /3<sup>rd</sup> Semester</b> | <b>Scheme of Study: 18Scheme</b>  |
| <b>Course Name : WORKSHOP AND MACHINE SHOP PRACTICE</b>             | <b>Course Code: 18MEL38A</b>  |
| CO1   | To read working drawings, understand operational symbols and execute machining operations   |
| CO2   | Prepare fitting models according to drawings using hand tools- V-block, marking gauge, files, hack saw, drills etc.   |
| CO3   | Understand integral parts of lathe, shaping and milling machines and various accessories and attachments used   |
| CO4   | Select cutting parameters like cutting speed, feed, depth of cut, and tooling for various machining operations  |
| CO5   | Perform cylindrical turning operations such as plain turning, taper turning, step turning, thread Cutting, facing, knurling, internal thread cutting, eccentric turning and estimate cutting time |

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| <b>Faculty: Aruna R</b>   |                                    |
| <b>Year/ Semester: 2<sup>nd</sup> Year /3<sup>rd</sup> Semester</b> | <b>Scheme of Study :18-Scheme</b>  |
| <b>Course Name: ADDITIONAL MATHEMATICS-1</b>                        | <b>Course Code:<br/>18MATDIP31</b> |

  
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|     |   |
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| CO1 | Apply concepts of complex numbers and vector algebra to analyze the problems arising in related area. |
| CO2 | Get Use derivatives and partial derivatives to calculate rate of change of multivariate functions.    |
| CO3 | Analyze position, velocity and acceleration in two and three dimensions of vector valued functions.   |
| CO4 | Learn techniques of integration including the evaluation of double and triple integrals.              |
| CO5 | Identify and solve first order ordinary differential equations.                                       |

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| <b>Faculty: Mr. Shashidhar S N</b>                                  |   |
| <b>Year/ Semester: 2<sup>nd</sup> Year /4<sup>th</sup> Semester</b> | <b>Scheme of Study: 18-Scheme</b>   |
| <b>Course Name: ENGINEERING MATHEMATICS –IV</b>                     | <b>Course Code: 18MAT41</b>   |
| CO1   | Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.     |
| CO2   | Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing |
| CO3   | Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.       |
| CO4   | Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data               |
| CO5   | Construct joint probability distributions and demonstrate the validity of testing the hypothesis                                |

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| <b>Faculty: Mr. Lakshminarayan T H</b>                              |  |
| <b>Year/ Semester: 2<sup>nd</sup> Year /4<sup>th</sup> Semester</b> | <b>Scheme of Study: 18-Scheme</b>  |
| <b>Course Name: APPLIED THERMODYNAMICS</b>                          | <b>Course Code: 18ME42</b>   |
| CO1   | Apply thermodynamic concepts to analyze the performance of gas power cycles    |
| CO2   | Apply thermodynamic concepts to analyze the performance of vapour power cycles |

  
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| CO3 | Understand combustion of fuels and performance of I C engines  |
| CO4 | Understand the principles and applications of refrigeration systems and airconditioning systems.   |
| CO5 | Understand the working principle of Air compressors and Steam nozzles, applications, relevance of air and identify methods for performance improvement |

**Faculty: Mr Vijaypraveen PM**

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|--|---|----------------------------------|
| <b>Year/ Semester: 2<sup>nd</sup> Year /4<sup>th</sup>Semester</b> |   | <b>Scheme of Study:18-Scheme</b> |
| <b>Course Name: FLUID MECHANICS</b>                                |   | <b>Course Code: 18ME43</b>       |
| CO1  | Identify and calculate the key fluid properties used in the analysis of fluid behavior  |                                  |
| CO2  | Explain the principles of pressure, buoyancy and floatation   |                                  |
| CO3  | Apply the knowledge of fluid statics, kinematics and dynamics while addressing problems of mechanical and chemical engineering                      |                                  |
| CO4  | Explain the concept of boundary layer in fluid flow and apply dimensional analysis to form dimensionless numbers in terms of input output variables |                                  |
| CO5  | illustrate and explain the basic concept of compressible flow and CFD   |                                  |

**Faculty: Kumarswamy. J**

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|--|---|----------------------------------|
| <b>Year/ Semester: 2<sup>nd</sup> Year /4<sup>th</sup>Semester</b> |   | <b>Scheme of Study:18-Scheme</b> |
| <b>Course Name: KINAMATICS OF MACHINES</b>                         |   | <b>Course Code: 18ME44</b>       |
| CO1  | Knowledge of mechanisms and their motion.                                       |                                  |
| CO2  | Understand the inversions of four bar mechanisms.                               |                                  |
| CO3  | Analyse the velocity, acceleration of links and joints of mechanisms.           |                                  |
| CO4  | Analysis of cam follower motion for the motion specifications.                  |                                  |
| CO5  | Understand the working of the spur gears and gear trains speed ratio and torque |                                  |

**Faculty: Dr. Hanumanthe Gowda**

  
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| <b>Year/ Semester: 2<sup>nd</sup> Year /4<sup>th</sup>Semester</b> |   | <b>Scheme of Study: 18Scheme</b> |
| <b>Course Name: METAL CASTING AND WELDING</b>                      |   | <b>Course Code: 18ME45A</b>      |
| CO1  | Describe the casting process and prepare different types of cast products.                          |                                  |
| CO2  | Describe the casting process and prepare different types of cast products.                          |                                  |
| CO3  | Compare the Gas fired pit, Resistance, Coreless, Electrical and Cupola Metal Furnaces               |                                  |
| CO4  | Compare the Gravity, Pressure die, Centrifugal, Squeeze, slush and Continuous Metal mould castings. |                                  |
| CO5  | Understand the Solidification process and Casting of Non-Ferrous Metals                             |                                  |

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| <b>Faculty: Mrs. Shilpa T V</b>                                    |  |                                  |
| <b>Year/ Semester: 2<sup>nd</sup> Year /4<sup>th</sup>Semester</b> |  | <b>Scheme of Study: 18Scheme</b> |
| <b>Course Name: MECHANICAL MEASUREMENTS AND METROLOGY</b>          |  | <b>Course Code: 18ME46A</b>      |
| CO1  | Understand the objectives of metrology, methods of measurement, standards of measurement & various measurement parameters. |                                  |
| CO2  | Explain tolerance, limits of size, fits, geometric and position tolerances, gauges and their design                        |                                  |
| CO3  | Understand the working principle of different types of comparators   |                                  |
| CO4  | Describe measurement of major & minor diameter, pitch, angle and effective diameter of screw threads                       |                                  |
| CO5  | Explain measurement systems, transducers, intermediate modifying devices and terminating devices                           |                                  |

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| <b>Faculty: Mr. Nagesh H C</b> |
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| <b>Year/ Semester: 2<sup>nd</sup> Year /4<sup>th</sup>Semester</b> |   | <b>Scheme of Study: 18-Scheme</b> |
| <b>Course Name: MECHANICAL MEASUREMENTS AND METROLOGY LAB</b>      |   | <b>Course Code: 18MEL47B</b>      |
| CO1  | Understand Calibration of pressure gauge, thermocouple, LVDT, load cell, micrometer.  |                                   |
| CO2  | Apply concepts of Measurement of angle using Sine Centre/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set. |                                   |
| CO3  | Demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats   |                                   |
| CO4  | Analyse tool forces using Lathe/Drill tool dynamometer.   |                                   |
| CO5  | Analyse Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth Vernier/Gear tooth micrometer  |                                   |
| CO6  | Understand the concepts of measurement of surface roughness   |                                   |

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| <b>Faculty: Mrs. Shilpa T V</b>                                     |  |                                   |
| <b>Year/ Semester: 2<sup>nd</sup> Year /4<sup>th</sup> Semester</b> |  | <b>Scheme of Study: 18-Scheme</b> |
| <b>Course Name: FOUNDARY AND FORGIMG LAB</b>                        |  | <b>Course Code:18MEL48B</b>       |
| CO1   | Understand needs, functions, roles, scope and evolution of Management  |                                   |
| CO2   | Understand importance, purpose of Planning and hierarchy of planning and also analyze its types                        |                                   |
| CO3   | Discuss Decision making, Organizing, Staffing, Directing and Controlling   |                                   |
| CO4   | Select the best economic model from various available alternatives   |                                   |
| CO5   | Understand various interest rate methods and implement the suitable one and various depreciation values of commodities |                                   |

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| <b>Faculty: Dr. Sunil kumar K</b>                                  |  |                                   |
| <b>Year/ Semester: 3<sup>rd</sup> Year /5<sup>th</sup>Semester</b> |  | <b>Scheme of Study: 18-Scheme</b> |

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| <b>Course Name: MANAGEMENT AND ECONOMICS</b> |  | <b>Course Code: 18ME51</b> |
|--|--|----------------------------|
| CO1  | Understand needs, functions, roles, scope and evolution of Management                            |                            |
| CO2  | Understand importance, purpose of Planning and hierarchy of planning and also analyse its types. |                            |
| CO3  | Discuss Decision making, Organizing, Staffing, Directing and Controlling.                        |                            |
| CO4  | Select the best economic model from various available alternatives                               |                            |
| CO5  | Understand various interest rate methods and implement the suitable one                          |                            |

| <b>Faculty: Mr. Vinay A N</b>                                       |   |
|---|---|
| <b>Year/ Semester: 3<sup>rd</sup> Year /5<sup>th</sup> Semester</b> | <b>Scheme of Study: 18-Scheme</b>   |
| <b>Course Name: DESIGN OF MACHINE ELEMENTS I</b>                    | <b>Course Code: 18ME52</b>  |
| CO1   | Apply the concepts of selection of materials for given mechanical components.   |
| CO2   | List the functions and uses of machine elements used in mechanical systems  |
| CO3   | Apply codes and standards in the design of machine elements and select an element based on the manufacturer's catalogue.  |
| CO4   | Apply codes and standards in the design of machine elements and select an element based on the manufacturer's catalogue.  |
| CO5   | Demonstrate the application of engineering design tools to the design of machine components like shafts, couplings, power screws, fasteners, welded and riveted joints. |

| <b>Faculty: Mr. Vinay A N</b>                                       |                                   |
|---|-----------------------------------|
| <b>Year/ Semester: 3<sup>rd</sup> Year /5<sup>th</sup> Semester</b> | <b>Scheme of Study: 18-Scheme</b> |
| <b>Course Name: DYNAMICS OF MACHINES</b>                            | <b>Course Code: 18ME53</b>        |

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| CO1 | Analyse the mechanisms for static and dynamic equilibrium                                     |
| CO2 | Carry out the balancing of rotating and reciprocating masses                                  |
| CO3 | Analyse different types of governors used in real life situation                              |
| CO4 | Analyse the gyroscopic effects on disks, airplanes, stability of ships, two and four wheelers |
| CO5 | Understand the free and forced vibration phenomenon.  |

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| <b>Faculty: Dr. Gowrishankar T B</b>                               |  |
| <b>Year/ Semester: 3<sup>rd</sup> Year /5<sup>th</sup>Semester</b> | <b>Scheme of Study: 18-Scheme</b>  |
| <b>Course Name: TURBO MACHINES</b>                                 | <b>Course Code: 18ME54</b>   |
| CO1  | Model studies and thermodynamics analysis of turbomachines.  |
| CO2  | Analyse the energy transfer in Turbo machine with degree of reaction and utilisation factor              |
| CO3  | Classify, analyse and understand various type of steam turbine   |
| CO4  | Classify, analyse and understand various type of hydraulic turbine                                       |
| CO5  | Understand the concept of radial power absorbing machine and the problems involved during its operation. |

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| <b>Faculty: Mr. Raghavendra prasad</b>                             |   |
| <b>Year/ Semester: 3<sup>rd</sup> Year /5<sup>th</sup>Semester</b> | <b>Scheme of Study: 18-Scheme</b>   |
| <b>Course Name : FLUID POWER ENGINEERING</b>                       | <b>Course Code: 18ME55</b>  |
| CO1  | Identify and analyse the functional requirements of a fluid power transmission system for a given application.                                    |
| CO2  | Visualize how a hydraulic/pneumatic circuit will work to accomplish the function  |
| CO3  | Design an appropriate hydraulic or pneumatic circuit or combination circuit like electro-hydraulics, electro- pneumatics for a given application. |

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| CO4 | Select and size the different components of the circuit.   |
| CO5 | Develop a comprehensive circuit diagram by integrating the components selected for the given application |

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| <b>Faculty: Dr. Sunilkuamr K</b>                                   |  |
| <b>Year/ Semester: 3<sup>rd</sup> Year /5<sup>th</sup>Semester</b> | <b>Scheme of Study: 18-Scheme</b>  |
| <b>Course Name: OPERATION MANAGEMENT</b>                           | <b>Course Code: 18ME56</b>   |
| CO1  | Explain the concept and scope of operations management in a business context   |
| CO2  | Recognize the role of Operations management among various business functions and its role in the organizations' strategic planning and gaining competitive advantage |
| CO3  | Analyze the appropriateness and applicability of a range of operations management systems/models in decision making  |
| CO4  | Assess a range of strategies for improving the efficiency and effectiveness of organizational operations   |
| CO5  | Evaluate a selection of frameworks used in the design and delivery of operations   |

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| <b>Faculty: Mr. Lakshminarayana T H</b>                            |  |
| <b>Year/ Semester: 3<sup>rd</sup> Year /5<sup>th</sup>Semester</b> | <b>Scheme of Study: 18-Scheme</b>  |
| <b>Course Name: FLUID MECHANICS /MACHINES LAB</b>                  | <b>Course Code: 18MEL57</b>  |
| CO1  | Perform experiments to determine the coefficient of discharge of flow measuring devices.                             |
| CO2  | Conduct experiments on hydraulic turbines and pumps to draw characteristics.   |
| CO3  | Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations. |
| CO4  | Determine the energy flow pattern through the hydraulic turbines and pumps   |
| CO5  | Exhibit his competency towards preventive maintenance of hydraulic machines  |

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| <b>Faculty: Dr. Gowrishankar</b>                                   |  |
| <b>Year/ Semester: 3<sup>rd</sup> Year /5<sup>th</sup>Semester</b> | <b>Scheme of Study: 18-Scheme</b>  |
| <b>Course Name: ENERGY CONVERSION LAB</b>                          | <b>Course Code: 18MEL58</b>  |
| CO1  | Perform experiments to determine the properties of fuels and oils.   |
| CO2  | Conduct experiments on engines and draw characteristics.   |
| CO3  | Test basic performance parameters of I.C. Engine.  |
| CO4  | Implement the knowledge in industry.   |
| CO5  | Identify exhaust emission, factors affecting them and exhibit his competency towards preventive maintenance of IC engines. |

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| <b>Faculty: Mrs Shilpa T V</b>                                     |  |
| <b>Year/ Semester: 3<sup>rd</sup> Year /5<sup>th</sup>Semester</b> | <b>Scheme of Study: 18-Scheme</b>  |
| <b>Course Name: ENVIRONMENTAL STUDIES</b>                          | <b>Course Code: 18CIV59</b>  |
| CO1  | Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,               |
| CO2  | Develop critical thinking and/or observation skills, and apply them to the analysis of a Problem or question related to the environment. |
| CO3  | Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.   |
| CO4  | Apply their ecological knowledge to illustrate and graph a problem.  |
| CO5  | Describe the realities that managers face when dealing with complex issues.  |

**Faculty: Mr. Vinay A N**

  
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| Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester |  | Scheme of Study:18-Scheme |
|--|--|---------------------------|
| Course Name : FINITE ELEMENT ANALYSIS                          |  | Course Code: 18ME61       |
| CO1  | Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements                         |                           |
| CO2  | Develop element characteristic equation and generation of global equation  |                           |
| CO3  | Formulate and solve Axi-symmetric and heat transfer problems.  |                           |
| CO4  | Apply suitable boundary conditions to a global equation for bars, trusses and beams.   |                           |
| CO5  | Apply suitable boundary conditions to a global equation for circular shafts, heat transfer, fluid flow, axi-symmetric and dynamic problems |                           |

| Faculty: Dr. Kumarswamy. J                                     |  |                            |
|--|--|----------------------------|
| Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester |  | Scheme of Study: 18-Scheme |
| Course Name: DESIGN OF MACHINE ELEMENTS -II                    |  | Course Code: 18ME62        |
| CO1  | Apply design principles for the design of mechanical systems involving springs, belts, pulleys, and wire ropes.  |                            |
| CO2  | Design different types of gears and simple gear boxes for relevant applications  |                            |
| CO3  | Understand the design principles of brakes and clutches.   |                            |
| CO4  | Apply design concepts of hydrodynamic bearings for different applications and select Anti friction bearings for different applications using the manufacturers, catalogue. |                            |
| CO5  | Become good design engineers through learning the art of working in a team.  |                            |

| Faculty: Dr. Gowrishanakar                                     |  |                            |
|--|--|----------------------------|
| Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester |  | Scheme of Study: 18-Scheme |
| Course Name: HEAT TRANSFER                                     |  | Course Code:18ME63         |
| CO1  | Understand the modes of heat transfer and apply the basic laws to formulate engineering systems  |                            |
| CO2  | Understand and apply the basic laws of heat transfer to extended surface, composite material and unsteady state heat transfer problems |                            |
| CO3  | Analyze heat conduction through numerical methods and apply the fundamental principle to solve radiation heat transfer problems        |                            |

  
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| CO4 | Analyze heat transfer due to free and forced convective heat transfer   |
| CO5 | Understand the design and performance analysis of heat exchangers and their practical applications, Condensation and Boiling phenomena. |

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| <b>Faculty: Mrs. Shilpa T V</b>                                    |  |
| <b>Year/ Semester: 3<sup>rd</sup> Year /6<sup>th</sup>Semester</b> | <b>Scheme of Study:18-Scheme</b>   |
| <b>Course Name: NON TRADITIONAL MACHINING</b>                      | <b>Course Code: 18ME641</b>  |
| CO1  | Understand the compare traditional and non-traditional machining process and recognize the need for Non- traditional machining process   |
| CO2  | Understand the constructional features, performance parameters, process characteristics, applications, advantages and limitations of USM, AJM and WJM  |
| CO3  | Identify the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations |
| CO4  | Understand the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM  |
| CO5  | Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM                                |

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| <b>Faculty: Dr. Harish R S</b>                                     |   |
| <b>Year/ Semester: 3<sup>rd</sup> Year /6<sup>th</sup>Semester</b> | <b>Scheme of Study: 18-Scheme</b>   |
| <b>Course Name: OPERATIONAL HEALTH AND SAFETY</b>                  | <b>Course Code: 18CV653</b>   |
| CO1  | Appreciate the elements of Corporate Environmental Management systems complying to international environmental management system standards. |
| CO2  | Lead pollution prevention assessment team.  |
| CO3  | implement waste minimization option.  |
| CO4  | Develop, Implement and maintain.  |
| CO5  | Audit Environmental Management systems for Organizations.   |

*W. Gowda*

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|---|---|
| <b>Faculty: Dr. Kumarswamy J</b>                                    |   |
| <b>Year/ Semester: 3<sup>rd</sup> Year /6<sup>th</sup> Semester</b> | <b>Scheme of Study: 18-Scheme</b>   |
| <b>Course Name: COMPUTER AIDED MODELLING AND ANALYSIS LAB</b>       | <b>Course Code: 18MEL66</b>   |
| CO1   | Demonstrate the basic features of an analysis package. Use the modern tools to formulate the problem and able to create geometry and descritize,                                      |
| CO2   | Apply boundary condition to solve problems of bars, truss, beams, plate to find stress with different loading conditions.   |
| CO3   | Demonstrate the deflection of beams subjected to point, uniformly distributed and varying loads further to use the available results to draw shear force and bending moment diagrams. |
| CO4   | Analyze the given problem by applying basic principle to solve and demonstrate 1D and 2D heat transfer with conduction and convection boundary conditions.                            |
| CO5   | Carry out dynamic analysis and finding natural frequencies for various boundary conditions and also analyze with forcing function.  |

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| <b>Faculty: Mr Raghavendra prasad</b>                               |   |
| <b>Year/ Semester: 3<sup>rd</sup> Year /6<sup>th</sup> Semester</b> | <b>Scheme of Study: 18-Scheme</b>   |
| <b>Course Name: HEAT TRANSFER LAB</b>                               | <b>Course Code: 18MEL67</b>   |
| CO1   | Perform experiments to determine the thermal conductivity of a metal rod  |
| CO2   | Conduct experiments to determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values. |
| CO3   | Estimate the effective thermal resistance in composite slabs and efficiency in pin-fin  |
| CO4   | Determine surface emissivity of a test plate Estimate performance of a refrigerator and effectiveness of fin                                |
| CO5   | Calculate temperature distribution of study and transient heat conduction through plane wall, cylinder and fin using numerical approach.    |

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| <b>Faculty: Dr. Gowrishanakar</b>                                   |                                   |
| <b>Year/ Semester: 3<sup>rd</sup> Year /6<sup>th</sup> Semester</b> | <b>Scheme of Study: 18-Scheme</b> |

  
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| Course Name : MINI-PROJECT |   | Course Code:18MEMP68 |
|----------------------------|---|----------------------|
| CO1                        | Demonstrate an ability to identify and formulate a hypothesis for a given problem and test through appropriate experiments. |                      |
| CO2                        | Apply relevant modern tools to solve the chosen technical problem.  |                      |
| CO3                        | Analyze and evaluate the experimental results and propose suitable modifications to improve performance.                    |                      |
| CO4                        | Work effectively as a member or a leader of a team.   |                      |
| CO5                        | Communicate technical content effectively through written report and oral presentations.                                    |                      |

| Faculty: Dr. Sunilkumar K                                      |  |                            |
|--|--|----------------------------|
| Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester |  | Scheme of Study: 18-Scheme |
| Course Name: CONTROL ENGINEERING                               |  | Course Code: 18ME71        |
| CO1  | Identify the type of control and control actions and Develop the mathematical model of the physical systems                                  |                            |
| CO2  | Estimate the response and error in response of first and second order systems subjected standard input signals.                              |                            |
| CO3  | Represent the complex physical system using block diagram and signal flow graph and obtain transfer function                                 |                            |
| CO4  | Analyse a linear feedback control system for stability using Hurwitz criterion, Routh's criterion and root Locus technique in complex domain |                            |
| CO5  | Analyse the stability of linear feedback control systems in frequency domain using polar plots, Nyquist and Bode plots.                      |                            |

| Faculty: Mr. Nagesh H C  |  |                            |
|--|--|----------------------------|
| Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester |  | Scheme of Study: 18-Scheme |
| Course Name: COMPUTER AIDED DESIGN AND MANUFACTURING           |  | Course Code: 18ME72        |
| CO1  | Define Automation, CIM, CAD, CAM and explain the differences between these concepts. Solve simple problems of transformations of entities on computer screen |                            |
| CO2  | Explain the basics of automated manufacturing industries through mathematical models and analyze different types of automated flow lines                     |                            |
| CO3  | Analyse the automated flow lines to reduce time and enhance productivity   |                            |

  
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| CO4 | Explain the use of different computer applications in manufacturing, and able to prepare part programs   |
| CO5 | Visualize and appreciate the modern trends in Manufacturing like additive manufacturing, Industry 4.0 and applications of Internet of Things leading to Smart Manufacturing. |

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| <b>Faculty: Dr. Gowrishankar T B</b>                                |                                   |
| <b>Year/ Semester: 4<sup>th</sup> Year /7<sup>th</sup> Semester</b> | <b>Scheme of Study: 18-Scheme</b> |
| <b>Course Name: ENVIRONMENT PROBLEMS AND MANAGEMENT</b>             | <b>Course Code: 18ME753</b>       |

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| CO1 | Appreciate the elements of Corporate Environmental Management systems complying to international environmental management system standards. |
| CO2 | Lead pollution prevention assessment team.  |
| CO3 | Implement waste minimization options.   |
| CO4 | Develop, Implement and maintain.  |
| CO5 | Audit Environmental Management systems for Organizations.   |

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| <b>Faculty: Dr. Sreenivasareddy M</b>                               |   |
| <b>Year/ Semester: 4<sup>th</sup> Year /7<sup>th</sup> Semester</b> | <b>Scheme of Study: 18-Scheme</b>   |
| <b>Course Name: OPERATION RESEARCH</b>                              | <b>Course Code: 18ME735</b>   |
| CO1   | Understand the meaning, definitions, scope, need, phases and techniques of operations research. Formulate as L.P.P and derive optimal solutions to linear programming problems by graphical method, Simplex method, Big-M method and Dual Simplex method. |
| CO2   | Formulate as Transportation and Assignment problems and derive optimum solutions for transportation, Assignment and travelling salesman problems.   |
| CO3   | Solve problems on game theory for pure and mixed strategy under competitive environment and solve waiting line problems for M/M/1 and M/M/K queuing models.   |
| CO4   | Construct network diagrams and determine critical path, floats for deterministic and PERT networks including crashing of Networks.  |

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| CO5 | Determine minimum processing times for sequencing of n jobs-2 machines, n jobs3 machines, n jobs-m machines and 2 jobs-n machines using Johnson's algorithm. |
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| <b>Faculty: Dr. Sunilkumar K</b>                                    |   |
| <b>Year/ Semester: 4<sup>th</sup> Year /7<sup>th</sup> Semester</b> | <b>Scheme of Study: 18-Scheme</b>   |
| <b>Course Name: ADDITIVE MANUFACTURING</b>                          | <b>Course Code: 18ME741</b>   |
| CO1   | Demonstrate the knowledge of the broad range of AM processes, devices, capabilities and materials that are available. |
| CO2   | Demonstrate the knowledge of the broad range of AM processes, devices, capabilities and materials that are available  |
| CO3   | Understand the various software tools, processes and techniques that enable advanced/additive manufacturing           |
| CO4   | Understand characterization techniques in additive manufacturing  |
| CO5   | Understand the latest trends and business opportunities in additive manufacturing                                     |

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| <b>Faculty: Mr. Nagesh H C</b>                                      |  |
| <b>Year/ Semester: 4<sup>th</sup> Year /7<sup>th</sup> Semester</b> | <b>Scheme of Study: 18-Scheme</b>  |
| <b>Course Name: CIM LAB</b>   | <b>Course Code: 18MEL76</b>  |
| CO1   | Understand the techniques of CNC programming   |
| CO2   | Understand the cutting tool path generation through CNC simulation software by using G-Codes and M-codes |
| CO3   | Demonstrate the usage of CAM packages.   |
| CO4   | Understand the importance of automation in industries through exposure to FMS, Robotics,                 |
| CO5   | Study the importance of automation in Hydraulics and Pneumatics.   |

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| <b>Faculty: Dr Kumaraswamy J</b>                                    |                                   |
| <b>Year/ Semester: 4<sup>th</sup> Year /7<sup>th</sup> Semester</b> | <b>Scheme of Study: 18-Scheme</b> |
| <b>Course Name: DESIGN LAB</b>                                      | <b>Course Code: 18MEL77</b>       |

  
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| CO1 | Compute the natural frequency of the free and forced vibration of single degree freedom systems, critical speed of shafts.  |
| CO2 | Carry out balancing of rotating masses and the governor characteristics.  |
| CO3 | Determine stresses in disk, beams, plates and hook using photo elastic bench.   |
| CO4 | Determination of Pressure distribution in Journal bearing.  |
| CO5 | Analyse the stress and strains using strain gauges in compression and bending test and stress distribution in curved beams. |

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| <b>Faculty: Dr. Sunilkumar K</b>   |   |
| <b>Year/ Semester: Year/ Semester: 4<sup>th</sup> Year /7<sup>th</sup>Semester</b> | <b>Scheme of Study: 18-Scheme</b>   |
| <b>Course Name: PROJECT PHASE – I</b>  | <b>Course Code: 18MEP78</b>   |
| CO1  | Demonstrate an ability to identify and formulate a hypothesis for a given problem and test through appropriate experiments. |
| CO2  | Apply relevant modern tools to solve the chosen technical problem.  |
| CO3  | Analyze and evaluate the experimental results and propose suitable modifications to improve performance.                    |
| CO4  | Work effectively as a member or a leader of a team.   |
| CO5  | Communicate technical content effectively through written report and oral presentations.                                    |

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| <b>Faculty: Lakshminarayana T H</b>  |  |
| <b>Year/ Semester: Year/ Semester: 4<sup>th</sup> Year /8<sup>th</sup>Semester</b> | <b>Scheme of Study: 18-Scheme</b>  |
| <b>Course Name: ENERGY ENGINEERING</b>   | <b>Course Code: 18ME81</b>   |
| CO1  | Understand the construction and working of steam generators and their accessories                      |
| CO2  | Identify renewable energy sources and their utilization  |
| CO3  | Identify renewable energy sources and their principles, advantages and disadvantages.                  |
| CO4  | Understand principles of energy conversion from alternate sources including wind, geothermal and ocean |

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| CO5 | Understand principles of energy conversion from alternate sources including biomass, nuclear, hydel and tidal |
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| <b>Faculty: Dr. Kumarswamy J</b>   |   |
| <b>Year/ Semester: Year/ Semester: 4<sup>th</sup> Year /8<sup>th</sup>Semester</b> | <b>Scheme of Study: 18-Scheme</b>   |
| <b>Course Name: TRIBOLOGY</b>  | <b>Course Code: 18ME822</b>   |
| CO1  | Understand the fundamentals of tribology and associated parameters  |
| CO2  | Apply concepts of tribology for the performance analysis and design of components experiencing relative motion. |
| CO3  | Analyse the requirements and design hydrodynamic journal and plane slider bearings for a given application.     |
| CO4  | Select proper bearing materials and lubricants for a given tribological application                             |
| CO5  | Apply the principles of surface engineering for different applications of tribology                             |

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| <b>Faculty: Dr. Sunilkumar K</b>   |   |
| <b>Year/ Semester: Year/ Semester: 4<sup>th</sup> Year /8<sup>th</sup>Semester</b> | <b>Scheme of Study: 18-Scheme</b>   |
| <b>Course Name: PROJECT PHASE – II</b>   | <b>Course Code: 18MEP83</b>   |
| CO1  | Demonstrate an ability to identify and formulate a hypothesis for a given problem and test through appropriate experiments. |
| CO2  | Apply relevant modern tools to solve the chosen technical problem.  |
| CO3  | Analyze and evaluate the experimental results and propose suitable modifications to improve performance.                    |
| CO4  | Work effectively as a member or a leader of a team.   |
| CO5  | Communicate technical content effectively through written report and oral presentations.                                    |

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| <b>Faculty: Dr. Gowrishankar T B</b>   |                                   |
| <b>Year/ Semester: Year/ Semester: 4<sup>th</sup> Year /8<sup>th</sup>Semester</b> | <b>Scheme of Study: 18-Scheme</b> |

  
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| Course Name: SEMINOR |  | Course Code: 18MES84 |
|----------------------|--|----------------------|
| CO1                  | Ability to develop Presentation skills.                        |                      |
| CO2                  | Ability to develop Listening skills.                           |                      |
| CO3                  | Ability to develop Discussion skills                           |                      |
| CO4                  | Ability to develop Argumentative skills and critical thinking. |                      |
| CO5                  | Ability to study major works.                                  |                      |

| Faculty: Mr Raghavendraprasad  |  |                            |
|--|--|----------------------------|
| Year/ Semester: Year/ Semester: 4 <sup>th</sup> Year /8 <sup>th</sup> Semester |  | Scheme of Study: 18-Scheme |
| Course Name: INTERNSHIP  |  | Course Code: 18ME851       |
| CO1  | Prepare graduates with a broad knowledge of Electronics and Communication engineering technology practices applicable to many different industry types   |                            |
| CO2  | To help students gain hands-on professional work experience prior to their graduation.   |                            |
| CO3  | To provide students possible opportunities to learn, understand and sharpen the real-time technical, managerial and life skills required at the job.     |                            |
| CO4  | To instill qualities such as confidence, maturity, responsibility, and social skills necessary for personal and professional growth.                     |                            |
| CO5  | To familiarize students to the business environment, which cannot be simulated in the classroom; thus creating competent professionals for the industry. |                            |

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