| | Information of every subject | |
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| 1 | Unit name: | Strength of materials- II |
| 2 | Code: | ME-4014 |
| 3 | Classification: | Engineering subject |
| 4 | Credit value: | 3 |
| 5 | Semester/ Year Offered: | 1/2 |
| 6 | Pre-requisite: | Applied Mechanic and ME 2014 (Strength of Material),ME-31014,Strength of material I |
| 7 | Mode of delivery: | Lecture, Practical |
| 8 | Practical | 20% |
| | Tutorials | 10% |
| | Mid-term/ final Examination | 35% / 35% |
| 9 | Academic staff teaching unit: | |
| 10 | Course outcome of unit:<br>In this course, students will be able<br>**Semester (I)**<br>(a). to explain the plane stress, sign conventions for normal stress and shear stress, principal stresses and maximum shear stresses, Mohr's stress circle and Mohr's strain circle, Triaxial stress and plane strain<br>(b). to derive the transformation equations for plane stress, uniaxial stress, pure shear stress and biaxial stress equations, principal stresses and maximum shear stresses equations, transformation equations for plane strain, and to construct Mohr's circle, the equations of deflection curve, angle of rotation<br>(c). to calculate the normal and shear stresses acting on inclined plane, principal stress and maximum shear stress, principal strain and maximum shear strain<br>(d).to describe the deflections by integration of the bending- moment equation and shear-force and load equations, moment area method, and strain energy of bending<br>(e). to derive the equations of deflection curve, angle of rotation and to compute the deflection and angle of rotation<br>(f). to practice the engineering theory concepts using lab equipment | |

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| | **Semester (II)**<br><br>In this course, students will be able<br>(g). to understand stresses and strains in beams, shafts, and bars<br><br>(h) to drive the formulas<br><br>(i) to solve the problems such as normal stress, normal strain, and shear stress and shear strain using formulas<br><br>(j) to practice using theory concepts and concepts of calculated examples and problems deflections of beams, bending stress, Spring Stiffness and thin cylinder internal pressure<br><br>(k) tensile stress, compressive stress, bending stress, shear strain, |
| 11 | Synopsis of unit:<br>On completion of this unit, a student shall be able to:<br>The course introduces students to the study of normal stresses, shear stress and principal stress principal strains and maximum shear strain, deflection and angle of rotation in beams, shafts, and bars. Course comprehends normal stress, shear stress, principal stresses, principal strain ,maximum shear stress, shear strain, shear force, bending moment, and bending stress in beams, deflection and angle of rotation, strain energy of bending, then can be solved problems. And then, it can be applied in practical lab and the engineer field such as industry and construction.<br><br>The course introduces students to the study of stresses and strains in beams, shafts, and bars. Course comprehends principal stresses, maximum shear stress, shear strain, shear force, bending moment, and bending stress in beams deflection strain energy of bending, springs and thin cylinder internal pressure, and then can be solved problems. And then, it can be applied in practical lab and the engineer field such as industry and construction. |

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| 12 | Topic:<br>**Semester (I)**<br>**1 Analysis of Stress and Strain**<br>1.1.Introduction<br>1.2.Plane Stress<br>1.3. Principal Stresses and Maximum Shear Stress<br>1.4. Mohr's Circle for Plane Stress<br>1.5.Triaxial Stress<br>1.6.Plane Strain<br>**2 Deflection of Beams**<br>2.1.Introduction<br>2.2.Deflections by Integration of the Bending-Moment Equation<br>2.3. Deflections by Integration of the Shear-Force and Load Equations<br>2.4. Moment-Area Method<br>2.5.Strain Energy of Bending<br><br>**Semester (II)**<br>**1 BENDING STRESS**<br>1.1. Bending Stresses<br>1.2. Composite Beams.<br>1.3. Reinforced Concrete Beams<br><br>**2 SPRINGS**<br>2.1. Close-coiled Helical Springs.<br>2.2. Open-coiled Helical Springs.<br>2.3. Leaf Springs. Flat Spiral Springs<br><br>**3 CYLINDERS AND SPHERES**<br>3.1. Thin Cylinder under Internal Pressure<br>3.2. Thin Spherical Shell under Internal Pressure<br>3.3. Cylindrical Shell with Hemispherical Ends<br>3.4. Thick Cylinders<br>3.5. Volumetric Strain on Capacity |

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| 14 | Main references:<br><br>MECHANICS OF MATERAL, JAME M. GERE BARRY J.GOODNO,<br>SEVENTH EDITION, Strength of Materials 'I G. H. RYDER M.A.(Cantab.), A.M.I.Mech.E. Principal Lecturer Royal Military College of Science, Shrivenham, THIRD EDITION IN Sl UNITS |
| 15 | Additional references:<br><br>STRENGTH OF MATERIALS, S. I Units, REVISED FOURTH EDTION |