Course Specifications

University: Benha University  Faculty: High Institute of Technology

Course specifications
Programme(s) on which the course is given  Electrical Engineering
Major or minor element of programmes  Minor
Department offering the programme  Electrical Engineering
Department offering the course  Mechanical Engineering
Academic year / Level  2008-2009 / Level 2 - Semester 2
Date of specification approval  June, 2009

A- Basic Information
Title: Strength of Materials and Machine Design  Code: M 062
Credit Hours:  Lecture: 2
Tutorial: 1  Practical: 1  Total: 4

B- Professional Information
1 - Overall aims of course
By the end of the course the students will be able to:

✓ Demonstrate knowledge of how engineering fundamentals are applied to mechanical engineering design.
✓ Demonstrate knowledge of how functional and economically feasible solutions can be obtained through proper design.
✓ Demonstrate knowledge on the classifications, Production and properties of Engineering materials.
✓ Getting familiar with the kinematics of power transmission techniques.
✓ Getting familiar with Design Procedure of power transmission elements.
✓ Define and solve problems in strength of material and machine design related to electrical applications.
2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding:
   a.1 Define procedure of design of machine elements.
   a.2 Understand engineering material classifications, properties and applications.
   a.3 Theories and techniques of power transmissions methods.
   a.4 Understand the different types of stresses on machine elements and theories used for stresses calculations.
   a.5 Understand the different procedure that can be used for design of machine elements.

b. Intellectual skills
   b.1 Solve basic problems for strength of material and machine design.
   b.2 How to select an engineering materials that suit the application of the machine elements.
   b.3 Estimation of stresses on machine elements and their applications.
   b.4 Know how to choose a suitable method for power transmissions.
   b.5 Getting a sense of predicting the machine elements dimensions that can resist its stresses
   b.6 Know how to estimate the dimensions of the machine elements to withstand under the applied stresses.

c- Professional and practical skills
   c.1 Use appropriate testing machines to measure the mechanical properties of materials.
   c.2 Selection of suitable power transmission method that can fit a certain applications.
   c.3 Selection of engineering materials that can fit a certain applications.

d- General and transferable skills
   d.1 Write reports in accordance with the scientific guidelines
   d.2 Present data on a scientific way
   d.3 Analysis of data and problems solving
   d.4 Discuss results and obtain conclusions
d.5 Work successfully as a part of a team

3- Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>No. of Hours</th>
<th>Lecture</th>
<th>Tutorial/Practical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering materials (Selection and properties):</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Introduction to Engineering Design:</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>General Consideration, General Procedure in Design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strength of materials: Stress, Strain, Types of Simple Stress</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>(tensile, compressive, shear, torsion, bending), Stress-Strain Diagram, Fatigue and Endurance Limit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design stresses: Combined stress, Factor of safety, Working stress</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>and design stresses – Basic consideration for the structure of machine elements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinematics of Power Transmissions:</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Introduction, Belts Drives, Chain Drives, Gears and Gear Trains,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friction Clutches</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design of Shafts, Axles and Keys by Strength Criteria:</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Introduction, Materials, Design Consideration, Design of Shafts based on Strength, Shafts under Fluctuating Loads, Design of Shafts Based on Rigidity, Keys and Keyways.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design of Riveted and Threaded Joints:</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Design of coupling:</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Introduction, Sleeve or Muff Coupling, Clamp or compression Coupling, Flange Coupling, Flexible Couplings, Universal Coupling, Fluid Coupling, Magnetic Coupling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design of Springs:</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

4– Teaching and learning methods

4.1- Lectures

4.2- Tutorials and discussion sessions
4.3- Laboratories

5- Student assessment methods

5.1 Written exams to assess the understanding of the concepts and the ability to solve problems of strength of materials and machine design

5.2 Oral exam to assess the skills of analysis and discussion,

5.3 Class work to assess the discussion of the technical reports assignments

Assessment schedule

Assessment 1 (Written Exam) Week 5
Assessment 2 (Written Exam) Week 10
Assessment 3 (Class Work) Weeks 1 to Week 15 (Continuous)
Assessment 4 (Oral Exam) Week 15
Assessment 5 (Final Written Exam) Week 16

Weighting of assessments

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment 1 (Written Exam)</td>
<td>10 %</td>
</tr>
<tr>
<td>Assessment 2 (Written Exam)</td>
<td>10 %</td>
</tr>
<tr>
<td>Assessment 3 (Class Work)</td>
<td>15 %</td>
</tr>
<tr>
<td>Assessment 4 (Oral Exam)</td>
<td>5 %</td>
</tr>
<tr>
<td>Final Written Exam</td>
<td>60 %</td>
</tr>
<tr>
<td>Total</td>
<td>100 %</td>
</tr>
</tbody>
</table>

6- List of references

6.1- Course notes
Lecture notes

6.2- Essential books (text books)

6.3- Recommended books

6.4- Periodicals, Web sites, … etc

7- Facilities required for teaching and learning
Teaching facilities (whiteboard, presentation board, data show)
Laboratory

Course coordinator: Dr. Sameh Nada
Head of Department: Dr. Sameh Nada
Date: / /