



# GOVERNMENT POLYTECHNIC, NABARANGPUR

## DEPARTMENT OF MECHANICAL ENGINEERING

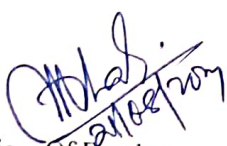
| Discipline:<br><b>MECHANICAL<br/>ENGG</b>             | Semester:<br><b>5<sup>TH</sup></b>                                                                                                                                                                                                                                                                                                                                                 | Name of the Teaching Faculty: Er. Mithun Kumar Keshari                                                       |
|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Subject:<br><b>DESIGN OF<br/>MACHINE<br/>ELEMENTS</b> | No. of<br>days/per<br>week class<br>allotted: 04                                                                                                                                                                                                                                                                                                                                   | Semester From date: 21.08.2024 To Date: 08.11.2024<br><br>No. of Weeks: 12                                   |
| <b>COURSE<br/>OUTCOMES</b>                            | <b>CO1:</b> Understand the standard procedure for design of machine elements<br><b>CO2:</b> Understand the design of various fastening elements with their uses<br><b>CO3:</b> Understand the function of shaft and keys and their uses in engineering applications<br><b>CO4:</b> Design couplings used for power transmission<br><b>CO5:</b> Design closed coiled helical spring |                                                                                                              |
| Week                                                  | Class Day                                                                                                                                                                                                                                                                                                                                                                          | Theory/Practical Topics                                                                                      |
| 1 <sup>ST</sup>                                       | 1 <sup>ST</sup>                                                                                                                                                                                                                                                                                                                                                                    | Introduction to Machine design & its classification                                                          |
|                                                       | 2 <sup>ND</sup>                                                                                                                                                                                                                                                                                                                                                                    | State the types of loads, define stress and strain                                                           |
|                                                       | 3 <sup>RD</sup>                                                                                                                                                                                                                                                                                                                                                                    | State mechanical & physical properties of the material                                                       |
|                                                       | 4 <sup>TH</sup>                                                                                                                                                                                                                                                                                                                                                                    | Define working stress, yield stress, ultimate stress and Factor of safety, stress strain curve for M.S & C.I |
| 2 <sup>ND</sup>                                       | 1 <sup>ST</sup>                                                                                                                                                                                                                                                                                                                                                                    | Explain the different modes of failure of a material                                                         |
|                                                       | 2 <sup>ND</sup>                                                                                                                                                                                                                                                                                                                                                                    | Factors governing the design of machine elements                                                             |
|                                                       | 3 <sup>RD</sup>                                                                                                                                                                                                                                                                                                                                                                    | Describe design procedure                                                                                    |
|                                                       | 4 <sup>TH</sup>                                                                                                                                                                                                                                                                                                                                                                    | <b>QUIZ &amp; ASSIGNMENT-I</b>                                                                               |
| 3 <sup>RD</sup>                                       | 1 <sup>ST</sup>                                                                                                                                                                                                                                                                                                                                                                    | Define a joint and classify them                                                                             |
|                                                       | 2 <sup>ND</sup>                                                                                                                                                                                                                                                                                                                                                                    | Types of welded joints, advantages of welded joints over other joints                                        |
|                                                       | 3 <sup>RD</sup>                                                                                                                                                                                                                                                                                                                                                                    | Design of welded joints                                                                                      |
|                                                       | 4 <sup>TH</sup>                                                                                                                                                                                                                                                                                                                                                                    | Problem solving                                                                                              |
| 4 <sup>TH</sup>                                       | 1 <sup>ST</sup>                                                                                                                                                                                                                                                                                                                                                                    | Problem solving                                                                                              |
|                                                       | 2 <sup>ND</sup>                                                                                                                                                                                                                                                                                                                                                                    | Determine strength of welded joints for eccentric loads                                                      |
|                                                       | 3 <sup>RD</sup>                                                                                                                                                                                                                                                                                                                                                                    | Contd.                                                                                                       |
|                                                       | 4 <sup>TH</sup>                                                                                                                                                                                                                                                                                                                                                                    | Problem solving                                                                                              |
| 5 <sup>TH</sup>                                       | 1 <sup>ST</sup>                                                                                                                                                                                                                                                                                                                                                                    | Problem solving                                                                                              |
|                                                       | 2 <sup>ND</sup>                                                                                                                                                                                                                                                                                                                                                                    | Explain types of riveted joints and types of rivets                                                          |
|                                                       | 3 <sup>RD</sup>                                                                                                                                                                                                                                                                                                                                                                    | Describe failure of riveted joints                                                                           |
|                                                       | 4 <sup>TH</sup>                                                                                                                                                                                                                                                                                                                                                                    | Determine strength and efficiency of riveted joints                                                          |
| 6 <sup>TH</sup>                                       | 1 <sup>ST</sup>                                                                                                                                                                                                                                                                                                                                                                    | Problem solving                                                                                              |
|                                                       | 2 <sup>ND</sup>                                                                                                                                                                                                                                                                                                                                                                    | Design riveted joints for pressure vessel                                                                    |
|                                                       | 3 <sup>RD</sup>                                                                                                                                                                                                                                                                                                                                                                    | Problem solving                                                                                              |
|                                                       | 4 <sup>TH</sup>                                                                                                                                                                                                                                                                                                                                                                    | State function, size and materials of shafts                                                                 |
| 7 <sup>TH</sup>                                       | 1 <sup>ST</sup>                                                                                                                                                                                                                                                                                                                                                                    | Design solid and hollow shafts based on strength and Rigidity                                                |
|                                                       | 2 <sup>ND</sup>                                                                                                                                                                                                                                                                                                                                                                    | Problem solving                                                                                              |
|                                                       | 3 <sup>RD</sup>                                                                                                                                                                                                                                                                                                                                                                    | State functions, types and material of keys                                                                  |
|                                                       | 4 <sup>TH</sup>                                                                                                                                                                                                                                                                                                                                                                    | Describe failure of key & effect of keyway                                                                   |
| 8 <sup>TH</sup>                                       | 1 <sup>ST</sup>                                                                                                                                                                                                                                                                                                                                                                    | Design rectangular key against shear and crushing failure                                                    |
|                                                       | 2 <sup>ND</sup>                                                                                                                                                                                                                                                                                                                                                                    | Design rectangular key using empirical relation                                                              |

|                  |                 |                                                                                                                                                       |
|------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | 3 <sup>RD</sup> | State specification of different types of keys as per I.S,<br>Problem solving                                                                         |
|                  | 4 <sup>TH</sup> | Define coupling and state its types                                                                                                                   |
| 9 <sup>TH</sup>  | 1 <sup>ST</sup> | State the requirements of a good shaft coupling                                                                                                       |
|                  | 2 <sup>ND</sup> | Design of sleeve or muff coupling, Problem solving                                                                                                    |
|                  | 3 <sup>RD</sup> | Design of clamp or compression coupling, Problem solving                                                                                              |
|                  | 4 <sup>TH</sup> | <b>QUIZ &amp; ASSIGNMENT-II</b>                                                                                                                       |
| 10 <sup>TH</sup> | 1 <sup>ST</sup> | State the function and uses of springs<br>Materials used for helical springs, its types                                                               |
|                  | 2 <sup>ND</sup> | Standard size spring wire, Terms used in compression springs<br>Stress in helical spring of a circular wire End connection for helical tension spring |
|                  | 3 <sup>RD</sup> | Standard size spring wire, Terms used in compression springs<br>Stress in helical spring of a circular wire End connection for helical tension spring |
|                  | 4 <sup>TH</sup> | Deflection of helical spring of circular wire                                                                                                         |
| 11 <sup>TH</sup> | 1 <sup>ST</sup> | Surge in spring                                                                                                                                       |
|                  | 2 <sup>ND</sup> | Problem solving                                                                                                                                       |
|                  | 3 <sup>RD</sup> | <b>QUIZ &amp; ASSIGNMENT-III</b>                                                                                                                      |
|                  | 4 <sup>TH</sup> | Problem solving                                                                                                                                       |
| 12 <sup>TH</sup> | 1 <sup>ST</sup> | Chapter 1 – Revision                                                                                                                                  |
|                  | 2 <sup>ND</sup> | Chapter 2 – Revision                                                                                                                                  |
|                  | 3 <sup>RD</sup> | Chapter 3 - Revision                                                                                                                                  |
|                  | 4 <sup>TH</sup> | Chapter 4 – Revision, Chapter 5 – Revision, Chapter 6 - Revision                                                                                      |

#### LEARNING RESOURCES:

01. A textbook of Machine design by RS Khurmi and JK Gupta, S.Chand Publisher
02. Design of Machine elements by V.B. Bhandari, TMH
03. A textbook of Machine design by P.C. Sharma & D.K. Agarwal, S.K. Kataria & Sons
04. Design Data Handbook by S Md. Jalaludeen , Anuradha Publication

#### WEBSITE RESOURCES:

  
Sign. Of Faculty  
concerned

  
Sign. Of HOD I/C

  
Academic coordinator

  
Principal