

5th Sem, **Branch** : Mechanical Engineering**Subject** : Machine Design**Time** : 3 Hrs.**M.M.** : 100**SECTION-A**

**Note:** Multiple choice questions. All questions are compulsory. (10x1=10)

- Q.1 The property of the material to retain deformation is called (CO-1)  
a) Strength                      b) Toughness  
c) Plasticity                      d) Elasticity
- Q.2 For designing ductile materials, which of the following theories is/are used? (CO-4)  
a) Maximum shear stress theory  
b) Shear strain energy theory  
c) Both A & B  
d) None of the above
- Q.3 The desirable property for the material of the shafts is (CO-3)  
a) It should have high strength  
b) It should have good machinability  
c) It should have low notch sensitivity factor  
d) All of the above
- Q.4 While designing shafts, type of loading on the shafts may be (CO-5)  
a) Twisting  
b) Bending  
c) Combination of twisting and bending moments  
d) All of the above

- Q.5 Shape of a Woodruff key is like a (CO-1)  
a) Semi-circle                      b) Sphere  
c) Cylinder                      d) Trapezoid
- Q.6 Which of the following is a permanent fastening?  
a) Keys                      b) Bolts (CO-6)  
c) Cotters                      d) Rivets
- Q.7 The transverse fillet weld is designed for (CO-2)  
a) Tensile strength                      b) Compressive strength  
c) Bending strength                      d) Shear strength
- Q.8 A cotter joint is used to transmit (CO-6)  
a) Axial tensile load only  
b) Axial compressive load only  
c) Axial tensile and compressive loads  
d) Combined axial and twisting load
- Q.9 The largest diameter of an external or internal screw thread is known as (CO-1)  
a) Pitch diameter                      b) Major diameter  
c) Minor diameter                      d) Lead
- Q.10 the sleeve or muff coupling is designed as (CO-5)  
a) Thin cylinder                      b) Thick cylinder  
c) Solid shaft                      d) Hollow shaft

**SECTION-B**

**Note:** Objective type questions. All questions are compulsory. (10x1=10)

- Q.11 Name the various types of machine design. (CO-1)
- Q.12 What is maximum principal stress theory? (CO-4)
- Q.13 Name various types of the shafts. (CO-5)
- Q.14 Define equivalent bending moment. (CO-5)
- Q.15 Define keyway. (CO-2)
- Q.16 Define the terms related to screwed joint; (1) Pitch (2) Flank. (CO-2)

- Q.17 What do you mean by angle of thread? (CO-1)  
 Q.18 Enlist the permanent and temporary joints. (CO-6)  
 Q.19 What is the necessity of shaft coupling? (CO-5)  
 Q.20 IN which cases the use of threaded joint are not recommended? (CO-4)

### SECTION-C

**Note :** Short answer type questions. Attempt any twelve questions out of fifteen questions. (12x5=60)

- Q.21 Explain how factor of safety is selected? (CO-4)  
 Q.22 Explain fatigue and endurance limit. (CO-4)  
 Q.23 What is maximum stress theory? (CO-4)  
 Q.24 What is the difference between a shaft and axle? (CO-5)  
 Q.25 What effect has a key way on the strength of the shaft. (CO-5)  
 Q.26 What are the desirable properties of shaft materials? (CO-3)  
 Q.27 What is a key? Write the various uses of key. (CO-1)  
 Q.28 Explain how a welded joint differ from riveted joint? (CO-1)  
 Q.29 What is the difference between lap joint and butt joint? (CO-1)  
 Q.30 How do you differentiate between a knuckle joint and cotter joint? (CO-1)  
 Q.31 Why gibs are used in cotter joint? Explain with the help of a neat sketch the use of single and double gib. (CO-6)  
 Q.32 Explain the purpose and types of couplings. (CO-6)  
 Q.33 What are the factors to be investigated while selecting a coupling. (CO-6)

- Q.34 Discuss the advantages offered by threaded joints. (CO-6)  
 Q.35 Write screw threads nomenclature with diagram. (CO-2)

### SECTION-D

**Note :** Long Answer type question. Attempt any two questions. (2x10=20)

- Q.36 The shaft and the flange of a marine engine are to be designed for flange coupling. The flange is forged on the ends of the shaft. The following data is given. Power of engine = 4MW; speed of the engine = 110 rpm; Permissible shear stress in bolts and shafts = 70MPa; No.'s of bolts = 10; P.C.D. Of bolts = 1.8 x Dia of shaft. (CO-6)  
 Calculate  
 (1) Diameter of the shaft  
 (2) Diameter of the bolts  
 (3) Thickness of the flange  
 (4) Diameter of the flange  
 Q.37 Two plates of 25mm thickness each are to be joined with a single riveted double cover butt joint. Calculate diameter of the rivet, rivet pitch, cover thickness and mode of failure of the joint. The working stresses in tension and shearing are 100 MPa and 80 Mpa respectively. (CO-4)  
 Q.38 Find the diameter of a shaft which transmits 60KW at 60 rpm. If the maximum torque is 30% greater than the mean torque and the limit of torsional stress is  $60 \text{ MN/m}^2$  and the transverse modulus of elasticity is  $9 \times 10^4 \text{ MN/m}^2$ , calculate the maximum angle of twist in 3m length. (CO-5)