Code No: RR310305 **RR** **Set No. 2**

III B.Tech I Semester Examinations,November 2010
DESIGN OF MACHINE MEMBERS-I
Common to Mechanical Engineering, Production Engineering
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. The base of a pillar crane is fastened to the foundation by eight bolts spaced equally on a bolt circle of diameter 1.6 m. The diameter of the pillar base is 2m. Determine the size of bolts when the crane carries a load of 100 KN at a distance of 5m from the centre of the base. The allowable stress for the bolt material is 100 MPa. [16]

2. (a) A solid shaft is subjected to a bending moment of 2500 Nm and a torque of 7500 Nm. The ultimate tensile stress and ultimate shear stress of shaft material are 710 N/mm^2 and 480 N/mm^2 respectively. Determine the diameter of the shaft if a factor of safety is assured as 6.

   (b) A shaft rotating at 200 rpm is to transmit 150 kW. The simply supported length of the shaft is 5m. It carries two pulleys each weighing 2000N supported at a distance of 0.75m from the ends respectively. The allowable shear stress of the shaft material is 55 N/mm^2. Determine the diameter of the shaft.[8+8]

3. (a) Explain the salient features of the maximum principal stress theory and indicate under what conditions such a theory is useful?

   (b) A shaft is designed based on maximum distortion energy theory with a factor of safety of 2.0. The material used is 30C8 steel with a yield stress of 310 MPa. It is subjected to an axial load of 40 kN. Determine the maximum torque capacity. Diameter of the shaft is 20 mm. [6+10]

4. (a) Mention the composition of materials designated as 40C8, 40Cr1, 40C15S12 and 30Ni4Cr1.

   (b) List various advantages of Aluminium and Magnesium alloys giving their applications in engineering use. [8+8]

5. (a) Explain the following methods of reducing stress concentration
      i. Drilled holes
      ii. Using large fillet radius
      iii. Added grooves

   (b) A shaft is made of steel [ultimate tensile strength 700 MPa and yield point 420 MPa is subjected to a torque varying from 200N m] anti-clockwise to 600 N m clockwise. Calculate the diameter of the shaft if the factor of safety is 2 and it is based on the yield point and the endurance strength in shear.[6+10]

6. (a) Enumerate the different types of riveted joints.

(b) Two plates 16 mm thick are joined by a double riveted lap joint. The pitch of each row of rivets is 90 mm. The rivets are 25 mm in diameter. The permissible stresses are 140 MPa in tension, 80 MPa in shear and 160 MPa in crushing. Find the efficiency of the joint. [6+10]

7. (a) A rigid coupling is used to transmit 20kW power at 720rpm. There are four bolts and the pitch circle diameter of the bolts is 125mm. The bolts are made of steel 45C8 (syt = 380N/mm^2) and the factor of safety is 3. Determine the diameter of the bolt.

   (b) A universal coupling is used to connect two mild steel shafts transmitting a torque of 5000N-m. Assuming that the shafts are subjected to torsion only. Find the diameter of the shaft and pins. The allowable shear stresses for the shaft and pin may be taken as 60Mpa and 28Mpa respectively. [8+8]

8. (a) Discuss classifications and application of various keys.

   (b) Design a knuckle joint to transmit 120 kN, with permissible stresses in tension; shear and compression are 75 Mpa ;60 Mpa and 150 Mpa respectively. [6+10]

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Code No: RR310305 **RR** **Set No. 4**

III B.Tech I Semester Examinations,November 2010
DESIGN OF MACHINE MEMBERS-I
Common to Mechanical Engineering, Production Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Discuss classifications and application of various keys.
   (b) Design a knuckle joint to transmit 120 kN, with permissible stresses in tension; shear and compression are 75 Mpa ;60 Mpa and 150 Mpa respectively. [6+10]

2. (a) Explain the salient features of the maximum principal stress theory and indicate under what conditions such a theory is useful?
   (b) A shaft is designed based on maximum distortion energy theory with a factor of safety of 2.0. The material used is 30C8 steel with a yield stress of 310 MPa. It is subjected to an axial load of 40 kN. Determine the maximum torque capacity. Diameter of the shaft is 20 mm. [6+10]

3. (a) Mention the composition of materials designated as 40C8, 40Cr1, 40C15S12 and 30Ni4Cr1.
   (b) List various advantages of Aluminium and Magnesium alloys giving their applications in engineering use. [8+8]

4. (a) Enumerate the different types of riveted joints.
   (b) Two plates 16 mm thick are joined by a double riveted lap joint. The pitch of each row of rivets is 90 mm. The rivets are 25 mm in diameter. The permissible stresses are 140 MPa in tension, 80 MPa in shear and 160 MPa in crushing. Find the efficiency of the joint. [6+10]

5. (a) Explain the following methods of reducing stress concentration
      i. Drilled holes
      ii. Using large fillet radius
      iii. Added grooves
   (b) A shaft is made of steel [ultimate tensile strength 700 MPa and yield point 420 MPa is subjected to a torque varying from 200N m] anti-clockwise to 600 N m clockwise. Calculate the diameter of the shaft if the factor of safety is 2 and it is based on the yield point and the endurance strength in shear.[6+10]

6. The base of a pillar crane is fastened to the foundation by eight bolts spaced equally on a bolt circle of diameter 1.6 m. The diameter of the pillar base is 2m. Determine the size of bolts when the crane carries a load of 100 KN at a distance of 5m from the centre of the base. The allowable stress for the bolt material is 100 MPa. [16]

7. (a) A solid shaft is subjected to a bending moment of 2500 Nm and a torque of 7500 Nm. The ultimate tensile stress and ultimate shear stress of shaft material are 710 N/mm^2 and 480 N/mm^2 respectively. Determine the diameter of the shaft if a factor of safety is assured as 6.

   (b) A shaft rotating at 200 rpm is to transmit 150 kW. The simply supported length of the shaft is 5m. It carries two pulleys each weighing 2000N supported at a distance of 0.75m from the ends respectively. The allowable shear stress of the shaft material is 55 N/mm^2. Determine the diameter of the shaft.[8+8]

8. (a) A rigid coupling is used to transmit 20kW power at 720rpm. There are four bolts and the pitch circle diameter of the bolts is 125mm. The bolts are made of steel 45C8 (syt = 380N/mm^2) and the factor of safety is 3. Determine the diameter of the bolt.

   (b) A universal coupling is used to connect two mild steel shafts transmitting a torque of 5000N-m. Assuming that the shafts are subjected to torsion only. Find the diameter of the shaft and pins. The allowable shear stresses for the shaft and pin may be taken as 60Mpa and 28Mpa respectively. [8+8]

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Code No: RR310305 **RR** **Set No. 1**

III B.Tech I Semester Examinations,November 2010
DESIGN OF MACHINE MEMBERS-I
Common to Mechanical Engineering, Production Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Enumerate the different types of riveted joints.
   (b) Two plates 16 mm thick are joined by a double riveted lap joint. The pitch of each row of rivets is 90 mm. The rivets are 25 mm in diameter. The permissible stresses are 140 MPa in tension, 80 MPa in shear and 160 MPa in crushing. Find the efficiency of the joint. [6+10]

2. (a) Mention the composition of materials designated as 40C8, 40Cr1, 40C15S12 and 30Ni4Cr1.
   (b) List various advantages of Aluminium and Magnesium alloys giving their applications in engineering use. [8+8]

3. (a) Discuss classifications and application of various keys.
   (b) Design a knuckle joint to transmit 120 kN, with permissible stresses in tension; shear and compression are 75 Mpa ;60 Mpa and 150 Mpa respectively. [6+10]

4. The base of a pillar crane is fastened to the foundation by eight bolts spaced equally on a bolt circle of diameter 1.6 m. The diameter of the pillar base is 2m. Determine the size of bolts when the crane carries a load of 100 KN at a distance of 5m from the centre of the base. The allowable stress for the bolt material is 100 MPa. [16]

5. (a) Explain the following methods of reducing stress concentration
      i. Drilled holes
      ii. Using large fillet radius
      iii. Added grooves
   (b) A shaft is made of steel [ultimate tensile strength 700 MPa and yield point 420 MPa is subjected to a torque varying from 200N m] anti-clockwise to 600 N m clockwise. Calculate the diameter of the shaft if the factor of safety is 2 and it is based on the yield point and the endurance strength in shear.[6+10]

6. (a) A rigid coupling is used to transmit 20kW power at 720rpm. There are four bolts and the pitch circle diameter of the bolts is 125mm. The bolts are made of steel 45C8 (syt = 380N/mm^2) and the factor of safety is 3. Determine the diameter of the bolt.
   (b) A universal coupling is used to connect two mild steel shafts transmitting a torque of 5000N-m. Assuming that the shafts are subjected to torsion only. Find the diameter of the shaft and pins. The allowable shear stresses for the shaft and pin may be taken as 60Mpa and 28Mpa respectively. [8+8]

7. (a) A solid shaft is subjected to a bending moment of 2500 Nm and a torque of 7500 Nm. The ultimate tensile stress and ultimate shear stress of shaft material are 710 N/mm^2 and 480 N/mm^2 respectively. Determine the diameter of the shaft if a factor of safety is assured as 6.

   (b) A shaft rotating at 200 rpm is to transmit 150 kW. The simply supported length of the shaft is 5m. It carries two pulleys each weighing 2000N supported at a distance of 0.75m from the ends respectively. The allowable shear stress of the shaft material is 55 N/mm^2. Determine the diameter of the shaft.[8+8]

8. (a) Explain the salient features of the maximum principal stress theory and indicate under what conditions such a theory is useful?

   (b) A shaft is designed based on maximum distortion energy theory with a factor of safety of 2.0. The material used is 30C8 steel with a yield stress of 310 MPa. It is subjected to an axial load of 40 kN. Determine the maximum torque capacity. Diameter of the shaft is 20 mm. [6+10]

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Code No: RR310305 **RR** **Set No. 3**

III B.Tech I Semester Examinations,November 2010
DESIGN OF MACHINE MEMBERS-I
Common to Mechanical Engineering, Production Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) A solid shaft is subjected to a bending moment of 2500 Nm and a torque of 7500 Nm. The ultimate tensile stress and ultimate shear stress of shaft material are 710 N/mm^2 and 480 N/mm^2 respectively. Determine the diameter of the shaft if a factor of safety is assured as 6.
   (b) A shaft rotating at 200 rpm is to transmit 150 kW. The simply supported length of the shaft is 5m. It carries two pulleys each weighing 2000N supported at a distance of 0.75m from the ends respectively. The allowable shear stress of the shaft material is 55 N/mm^2. Determine the diameter of the shaft.[8+8]

2. (a) Enumerate the different types of riveted joints.
   (b) Two plates 16 mm thick are joined by a double riveted lap joint. The pitch of each row of rivets is 90 mm. The rivets are 25 mm in diameter. The permissible stresses are 140 MPa in tension, 80 MPa in shear and 160 MPa in crushing. Find the efficiency of the joint. [6+10]

3. (a) Explain the salient features of the maximum principal stress theory and indicate under what conditions such a theory is useful?
   (b) A shaft is designed based on maximum distortion energy theory with a factor of safety of 2.0. The material used is 30C8 steel with a yield stress of 310 MPa. It is subjected to an axial load of 40 kN. Determine the maximum torque capacity. Diameter of the shaft is 20 mm. [6+10]

4. (a) Explain the following methods of reducing stress concentration
      i. Drilled holes
      ii. Using large fillet radius
      iii. Added grooves
   (b) A shaft is made of steel [ultimate tensile strength 700 MPa and yield point 420 MPa is subjected to a torque varying from 200N m] anti-clockwise to 600 N m clockwise. Calculate the diameter of the shaft if the factor of safety is 2 and it is based on the yield point and the endurance strength in shear.[6+10]

5. The base of a pillar crane is fastened to the foundation by eight bolts spaced equally on a bolt circle of diameter 1.6 m. The diameter of the pillar base is 2m. Determine the size of bolts when the crane carries a load of 100 KN at a distance of 5m from the centre of the base. The allowable stress for the bolt material is 100 MPa. [16]

6. (a) Discuss classifications and application of various keys.

(b) Design a knuckle joint to transmit 120 kN, with permissible stresses in tension; shear and compression are 75 Mpa ;60 Mpa and 150 Mpa respectively. [6+10]

7. (a) A rigid coupling is used to transmit 20kW power at 720rpm. There are four bolts and the pitch circle diameter of the bolts is 125mm. The bolts are made of steel 45C8 (syt = 380N/mm^2) and the factor of safety is 3. Determine the diameter of the bolt.

(b) A universal coupling is used to connect two mild steel shafts transmitting a torque of 5000N-m. Assuming that the shafts are subjected to torsion only. Find the diameter of the shaft and pins. The allowable shear stresses for the shaft and pin may be taken as 60Mpa and 28Mpa respectively. [8+8]

8. (a) Mention the composition of materials designated as 40C8, 40Cr1, 40C15S12 and 30Ni4Cr1.

(b) List various advantages of Aluminium and Magnesium alloys giving their applications in engineering use. [8+8]

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