5th Sem / Mech
Subject:- Machine Design

Time : 3Hrs.   M.M. : 100

SECTION-A

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

Q.1   The property of a material by which it can be beaten or rolled into thin sheets is called   (CO1)
a)   Elasticity   b)   Ductility
c)   Plasticity   d)   Malleability

Q.2   Which of the following materials has maximum ductility?   (CO1)
a)   Gold   b)   Platinum
c)   Lead   d)   Silver

Q.3   Maximum strain energy theory is generally used for
(CO4)

a)   Ductile materials   b)   Hard materials
c)   Brittle materials   d)   Tough materials

Q.4   While designing shafts, type of loading on the shafts may be   (CO2)
a)   Twisting
b)   Combined twisting and bending
c)   Bending
d)   All of the above

Q.5   Generally, the material of key is   (CO3)
a)   Cast iron   b)   Aluminium
c)   Mild steel   d)   HSS

Q.6   In knuckle joint, pin is likely to fail is   (CO2)
a)   Tension   b)   Compression
c)   Double shear   d)   Shear

Q.7   The parallel fillet welded joint is designed for (CO6)
a)   Tensile strength   b)   Compressive strength
c)   Bending strength   d)   Shear strength

Q.8   The holes in plates for riveting is usually made by
(CO6)
a)   Drilling   b)   Punching
c)   Arc cutting   d)   Gas cutting

Q.9   Diameter of the cylindrical piece on which thread is cut is known as   (CO1)
a)   Nominal diameter   b)   Major diameter
c)   Minor diameter   d)   Any of the above

Q.10   The material of hub in flange coupling is   (CO3)
a)   Gun metal   b)   High speed steel
c)   Cast iron   d)   Mild steel

SECTION-B

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

Q.11   Write types of design.   (CO1)
Q.12   Define shearing load.   (CO1)
Q.13   Maximum principal strain threory is also known as
_____   (CO4)
Q.14   Define equivalent twisting moment.   (CO1)

Q.15 Name two main types of keys. (CO6)
Q.16 Write the use of knuckle joint? (CO6)
Q.17 Define fastening. (CO1)
Q.18 Define fullering. (CO1)
Q.19 Define lead of a thread (CO1)
Q.20 Write the function of rigid coupling. (CO6)

SECTION-C

Note: Short answer type questions. Attempt any four questions out of six questions. (4x10=40)

Q.21 Describe any five mechanical properties of materials. (CO3)

Q.22 Define key. Describe various types of sunk key. (CO6)

Q.23 What is the minimum length of the key which is 30mm wide? When it is used with a gear which is 100mm in diameter and designed to operate at a torsional working stress of $100\,MN/m^2$. (CO6)

Q.24 A 20 mm tap bolt fastens two machine elements tightly. If the load tending to separate these elements is neglected, find the stress set up in the bolt by initial tightening. (CO6)

Q.25 A plate 120 mm wide and 15 mm thick is to be welded to another plate by means of single transverse and double parallel fillet welds. Determine the length of each parallel fillet weld if the joint is subjected to load. Take allowable stress in tension as $76\,N/mm^2$ and in shear as $60\,N/mm^2$. (CO6)

Q.26 Define coupling. Give the necessity of coupling. (CO6)

SECTION-D

Note: Long answer type questions. Attempt any two questions out of three questions. (2x20=40)

Q.27 Design a cast iron flange coupling to connect two shafts 110 mm diameter running at 260 rpm for transmitting a torque of 4100 Nm. Take persmissible shear stress for shaft, bolt and key as $60\,MN/m^2$, crushing stress for bolts and key as $160\,MN/m^2$ and shear stress for cast iron as $10\,MN/m^2$. (CO2,4,6)

Q.28 Two plates, each of 25 mm thickness, are to be joined with a single riveted double cover butt joint. Calculate:
   i) Diameter of the rivet
   ii) Pitch of the rivet,
   iii) Thickness of cover plates and
   iv) Efficiency of the joint
   The working stresses in tension and shear are 100 MPa and 8 MPa respectively. (CO6)

Q.29 Find the maximum stress in propeller shaft having 500 mm external diameter and 250 mm internal diameter. it is subjected to twisting moment of 5000 Nm. If the modulus of rigidity is 90 GPa, how much is the twist in a length 25 times the external diameter? (CO2,4,5)