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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 design in which the designer makes minor changes and modification in existing design is called (CO1)
a) New design b) Development design
c) Adaptive design d) None of these

Q.2 Which of the following materials is more elastic? (CO3)
a) Wood b) Rubber
c) Steel d) Glass

Q.3 The property of material to retain deformation is called (CO3)
a) Strength b) Elasticity
c) Toughness d) Plasticity

Q.4 Maximum principal stress theory is generally used for (CO4)
a) Ductile materials b) Hard materials
c) Brittle materials d) tough materials

Q.5 The design of shaft is based upon (CO4)
a) Strength only b) Rigidity only
c) Both (a) and (b) d) None of the above

Q.6 Width of a taper sunk key in terms of diameter (d) of the shaft is (CO6)
a) d/8 b) d/4
c) 2d d) 3d

Q.7 In socket and spigot joint, failure of socket occurs due to (CO4)
a) Shearing
b) Bending
c) Tension across the slot
d) All of the above

Q.8 Traverse fillet welded joints are designed for (CO6)
a) Tensile strength b) Compressive strength
c) Bending strength d) Torsional strength

Q.9 Rivets are made of (CO3)
a) Brittle material b) Soft material
c) Ductile material d) Hard material

Q.10 In a flange coupling, the weakest element should be (CO6)
a) Key b) Flange
c) Shaft d) Bush

SECTION-B

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

Q.11 Define stress. (CO1)

Q.12 Name different types of loads according to manner of application of loads on the body. (CO1)

Q.13 Maximum strain energy theory is also known as _____ (CO4)

Q.14 Name the material used for making high strength shafts? (CO3)

Q.15 Define a round key. (CO6)

Q.16 Name the type of failure that occurs in cotter. (CO6)

Q.17 Give one example of permanent of joint. (CO6)

Q.18 Define one cotter. (CO6)

Q.19 Name any one type of rivet heads (CO6)

Q.20 Define slope of thread? (CO1)

SECTION-C

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

Q.21 Define design. Explain various types of designs. (CO1)

Q.22 Find out the strength of a double parallel fillet welded joint. (CO2)

Q.23 Explain caulking and fullering. (CO4)

Q.24 A shaft is required to transmit a power of 100kW at 100 rpm. What is the diameter of the shaft, if the maximum torque is 25% greater than the mean and limit of torsional stress is 60 MPa? (CO5)

Q.25 Two plates, each of 25 mm thickness, are to be joined with a single riveted double cover butt joint. Calculate the diameter of the rivet and pitch of the rivet. the working stresses in tension and shear are 100 MPa and 80 MPa respectively. (CO6)

Q.26 A flange coupling connects two shafts to transmit a torque to 25 Nm. The flanges of the coupling are fastened with the help of four bolts at a radius of 32 mm. Find the size of bolts. Take allowable shear stress for the bolt material as 30N/mm^2.

SECTION-D

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

Q.27 A 16 kW, 1000 rpm motor has a steel shaft of 40 mm diameter. The Extension of the shaft is 70 mm. Design the key required. Take:
Permissible shear stresses for the material of the key as 55 N/mm^2 and
Permissible crushing stresses for the material of the key as 110 N/mm^2
Also check the shear strength of key against the normal strength of shaft. (CO2,5)

Q.28 Design a knuckle joint to transmit 150 KN. The various design stresses are as follow:
Tensile stresses - 75 N/mm^2
Shear stress-60 N/mm^2
Crushing stress-150 N/mm^2 (CO6)

Q.29 Two 40 mm diameter shafts are to be connected by a cast iron flange coupling. The flanges are fitted with 6 bolts on 130 mm bolt circle. The two shafts transmit a torque of 850 Nm at 400 rpm. Calculate:
1. Diameter of bolts, 2 Thickness of flanges
3 Langth, width and thickness of key
4. Length of hub, 5 Power Transmitted .
Take safe shear stress for shaft material = 65 MPa, safe shear stress for bolt material = 58 MPa. Safe shear stress for cast iron = 12 MPa and safe shear stress for key material = 50 MPa. (CO2,6)