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4th Sem / Branch : Mech. Engg./Prod./T&D/ Mechatronics/(5th sem) CAD/CAM/CNC/Metallurgy/Adv.Manu. Tech,Mech.(Fabrication Tech)/CAD/CAM Design & Robotics

Subject:- Machine Design and Drawing

Time : 3Hrs. M.M. : 100

SECTION-A

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

Q.1 Which of the following expression is not correct for designing a shaft according to rigidity?

a) $T = GqJ/L$ b) $J = TL/Gq$

c) $q = TL/GJ$ d) $L = GqT/J$

Q.2 Yield strength is defined as the maximum stress at which a marked increase in elongation occurs without increase in _____

a) Load b) Strength

c) Toughness d) Hardness

Q.3 Which of the following theory of failure is mostly used for ductile materials?

a) Maximum principal stress theory

b) Maximum shear stress theory

c) Distortion energy theory

d) Haigh's theory

Q.4 Which of the following is not a type of transmission shaft?

a) Crankshaft b) Countershaft

c) Transmission shaft d) Line shaft

Q.5 The main advantage of sunk key is that it is a _____drive.

a) Positive b) Negative

c) Neutral d) None of the listed

Q.6 Which of the following is not a type of sunk key?

a) Square key b) Woodruff key

c) Gib headed key d) Hollow saddle key

Q.7 Which type of joints is better when the product is subjected to large vibrations welded or threaded?

a) Welded

b) Threaded

c) Both have same results

d) Depends on the magnitude of the vibrational force

Q.8 The angle between the direction of the follower motion and a normal to the pitch curve is called

a) pitch angle b) prime angle

c) base angle d) pressure angle

Q.9 A circle drawn with centre as the cam centre and radius equal to the distance between the cam centre and the point on the pitch curve at which the poressure angle is maximum, is called

a) base circle b) pitch circle

c) prime circle d) none of the mentioned

Q.10 In cycloidal gears contact area is

a) Comparatively smaller

b) Comparatively larger

c) Can't be determined

d) None of the listed

SECTION-B

Note: Very short answer type questions. Attempt any ten questions out of twelve questions. (10x2=20)

Q.11 What are live loads?

Q.12 State Hook's law.

Q.13 Name various types of loads on shaft.

Q.14 Define principal planes.

Q.15 Write bending equation for a shaft.

Q.16 Name different types of motions of followers.

Q.17 Write the disadvantage of screw threads.

Q.18 What is screw jack?

Q.19 What are the functions of power screws?

Q.20 Define tootle depth of a gear.

Q.21 What is equivalent bending moment?

Q.22 Define pressure angle.

SECTION-C

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

Q.23 i) What are the main mechanical properties of materials? Explain in detail. (10)

ii) What is machine design? Explain the types, necessity and procedure of machine design. (10)

Q.24 Describe gear. What are the advantages and disadvantages of gear drives? Explain the nomenclature of a gear. (20)

Q.25 Maximum shear stress of 160MN/m^2 is included in a hollow shaft having 120mm and 80mm external and internal diameter respectively. What maximum shear stress will be developed in a solid shaft of the same weight, material and length subjected to the same torque?

SECTION-D

Note: Long answer type questions. Attempt any one questions out of two questions. (1x30=30)

Q.26 Design and draw a screw jack, which is used to lift a load of 110KN, through a height of 450mm. The elastic strength of material of screw in tension and compression is 210N/mm^2 and in shear is 120N/mm^2. The elastic strength of material of nut is 110N/m^2 in tension 100N/mm^2 in compression and 90N/mm^2 in shear. The bearing pressure between nut and screw does not exceed 18N/mm^2.

Q.27 A cam, with a minimum radius of 40mm, rotating clockwise at a uniform speed is required to give a knife edge follower, the motion as described below:

i) To move outward through 50mm during 100° rotation of the cam

ii) To dwell for the next 80°

iii) to return to its starting position during next 90°

iv) To dwell for the rest period of a revolution i.e. 90°.

Draw the profile of the cam. The displacement of the follower is to take place with uniform acceleration and deceleration.