the diameter of the shaft by using max. Principal stress theory. E = 210 GPa, Factor of safety = 1.5. (20)

Q.25 Derive an expression for the torque required to lift a load by screw jack. (20)

SECTION-D

Note: Attempt any one parts. (1x30=30)

Q.26 Draw the profile of involute the teeth for a gear having 24 teeth & a module equal to 12mm. Assume pr. angle = 22°.

Q.27 A cam is to give the following motion to a knife edge follower:

i) Outstroke during 60° of cam rotation,
ii) Dwell for the next 30° of cam rotation,
iii) Return stroke during the next 60° of cam rotation,
iv) Dwell during the remaining 210° of cam rotation.

The stroke of the follower is 50mm and the minimum radius for the cam is 60mm. The follower moves with uniform velocity during both the outstroke and return stroke.

Draw the profile of the cam when the axis of the follower passes through the axis of the cam shaft.

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4th Sem / Mech. Engg. (MSIL)
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 is not the cause of stress concentration?

a) Abrupt changes in cross-section
b) Discontinuity in the component
c) Machining scratches
d) Point load applied on the component

Q.2 The tendency of a deformed solid to regain its actual proportions instantly upon unloading known as____

a) Perfectly elastic b) Delayed elasticity
c) Inelastic effect d) Plasticity

Q.3 A mechanical component may fail as a result of which of the following

a) each of the mentioned
b) general yielding
c) fracture
d) elastic deflection

Q.4 When the shaft is subjected to pure bending moment, the bending stress is given by?

a) None of the listed b) $32Mp/d^3$
c) $16M/pd^3$ d) $8M/pd^3$

Q.5 Flexible shafts have_____ rigidity in bending moment.
a) Low b) High
c) Very high d) Extremely low

Q.6 Woodruff key permits_____ movement b/w shaft and the hub.
a) Axial b) Radial
c) Eccentric d) None of the listed

Q.7 Which of the following displacement diagrams should be chosen for better dynamic performance of a cam-follower mechanism?
a) simple hormonic motion
b) parabolic motion
c) cycloidal motion
d) none of the mentioned

Q.8 Involute splines have stub teeth with a pressure angle of_____
a) 30 b) 45
c) 60 d) Can't be determined

Q.9 Greater the velocity ratio, smaller the gearbox.
a) True
b) Greater the gearbox
c) Size of gearbox remains unaffected
d) None of the listed

Q.10 Pressure angle is_____ in case of cycloidal teeth.
a) Constant b) zero
c) Variable d) None of the listed

SECTION-B

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

Q.11 Define shearing load.
Q.12 Define working stress.
Q.13 Explain the root of thread.
Q.14 Give classification of loads.
Q.15 Give the formula by which angle of twist by a circular shaft is calculated.
Q.16 Give the statement of normal strain theory.
Q.17 Define Factor of Safety
Q.18 What is screw jack?
Q.19 Name two types of cam.
Q.20 Define flank of a gear?
Q.21 Define cam and follower.
Q.22 Define involute.

SECTION-C

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

Q.23 i) Define stress concentration and give the various methods to reduce it. (10)
ii) Explain in detail the characteristics of a good designer. (10)

Q.24 A shaft made of steel is subjected to a bending moment of 15 KN-m & a torsional moment of 30 KN-m. The yield strength of a shaft is 750 MPa. Find