Q.24 Draw four involute teeth of a gear having 25 teeth of 10 mm module and 20^0 pressure angle. (20)

Q.25 i) What is minimum length of key which is 30 mm wide? When used with a gear which is 100 mm in diameter and designed to operate at a torsional working stress of 100 MN/m^2. (10)

ii) What is saddle key? Explain its different types. (10)

SECTION-D

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

Q.26 Design a shaft when subjected to combined twisting and bending moment.

Q.27 A cam is to be designed for a knife edge follower with the following data:

i) Cam lift = 60 mm during 90^0 of cam rotation with simple harmonic motion,

ii) Dwell for the next 30^0,

iii) During the next 60^0 of cam rotation, the follower returns to the original position with simple harmonic motion,

iv) Dwell during the remaining 180^0.

Draw the profile of the cam when the line of stroke of the follower passes through the axis of the cam shaft. The radius of the base circle of the cam is 50 mm. Determine the velocity and acceleration of the follower during its ascent and descent, if cam rotates at 180 r.p.m.

Roll No. .....

4th Sem / Mech, Prod, T&D, Mecatronics (5th Sem), CAD/CAM, CNC, Metallurgy, Adv. Manuf. Tech., Mech Engg (Fabrication Tech), Mech Engg (CAD/CAM Dsgn & 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 is measure of stiffness?

a) Modulus of elasticity
b) Modulus of plasticity
c) Resilience
d) Toughness

Q.2 Which of the following materials are subjected to the most severe stress concentration?

a) Ductile material under fluctuating load
b) Brittle materials under static and fluctuating load
c) Brittle materials under fluctuating load
d) Ductile materials under static load

Q.3 Which of the following mechanical devices transfer or multiples load with an application of small effort?

a) Gears b) Shafts
c) Levers d) Bearings

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

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

Q.5 Flexible shafts have_____rigidity in torsion making them flexible.
a) Low b) High
c) Very high d) Infinitely small

Q.6 A sunk key fits in the keyway of the _____ only.
a) Hub
b) Sleeve
c) Both hub and sleeve
d) Neither hub nor sleeve

Q.7 Which of the following does not form the important part of the screw jack?
a) Frame b) Nut
c) Cup d) Coupling

Q.8 In which case is the wear more?
a) Conventional power screw
b) Recirculating power screw
c) Equal in both the cases
d) Cannot be determined

Q.9 Bevel gears impose _____loads on the shafts.
a) Radial and thrust
b) Radial
c) Thrust
d) Neither radial nor thrust

Q.10 Cycloidal teeth consist of
a) Hypocycloid curve

b) Epicycloid gear
c) Both hypocycloid curve and epicycloid curve
d) None of the mentioned

SECTION-B

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

Q.11 Define stiffness.
Q.12 Describe creep.
Q.13 Give the statement of normal strain theory.
Q.14 What is a machine shaft?
Q.15 Name any two modes of failures of keys.
Q.16 Write advantages of screwed joints.
Q.17 Define tracing point.
Q.18 Define endurance limit.
Q.19 What are the materials used for high strength shafts?
Q.20 Name different types of machine design.
Q.21 What is angle of ascent.
Q.22 What is law of gearing?

SECTION-C

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

Q.23 i) Describe machine design. Explain the types, necessity and procedure of machine design. (10)

ii) State any one of the following theories of failure: (10)

a) Normal stress theory
b) Maximum shear stress theory