Seat No: _____________ Enrollment No: ___________________

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B. Tech. Summer 2017 - 18 Examination

Semester: 3 **Date: 15/06/2018**
Subject Code: 03101205 **Time: 02:00 pm to 04:30 pm**
Subject Name: Analysis of Mechanism & Machine Elements **Total Marks: 60**

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions **(15)**

1. Define completely the constrained motion.
2. Define Inversion of a mechanism.
3. Differentiate between lower pair and higher pair.
4. What is Fullering?
5. Strength of the Welded joint is higher than Rivet joint. True or False?
6. Maximum Principal stress theory is used for (Ductile / Brittle) material
7. The Grubler's criterion for determining the degrees of freedom (n) of a mechanism having plane motion is _____________________
8. The D.O.F. of four bar mechanism is________________
9. Magnitude of Corioli's component of acceleration is ________________
10. Draw rivet heads for 1)pan head 2)countersunk head
11. Parallel fillet welded joint is generally designed for ______________ stress
12. If n links are connected at the same joint, the joint is equivalent to
    (a) (n – 1) binary joints (b) (n – 2) binary joints
    (c) (2n – 1) binary joints (d) none of these
13. In a 4 – bar linkage, if the lengths of shortest, longest and the other two links are denoted by s, l, p and q, then it would result in Grashoff's linkage provided that
    (a) $l + p < s + q$ (b) $l + s < p + q$
    (c) $l + p = s + q$ (d) none of these
14. According to D' Alembert's principle, the body is in equilibrium position if
    a) Inertia force is applied in the direction opposite to the resultant force
    b) Inertia force is applied in the same direction of the resultant force
    c) Both a. and b.
    d) None of the above
15. The shafts are designed on the basis of
    (a) Rigidity
    (b) Strength
    (c) Both of these
    (d) Either of these

Q.2 Answer the following questions. (Attempt any three) **(15)**

A) A line shaft rotating at 200 r.p.m. is to transmit 20 kW. The shaft may be assumed to be made of mild steel with an allowable shear stress of 42 MPa. Determine the diameter of the solid shaft, neglecting the bending moment on the shaft.
B) With help of neat sketch explain Crank and slotted quick return motion mechanism.
C) Explain Principle of virtual work for slider crank mechanism with neat sketch.
D) What are the advantages of welded joints over riveted joints?

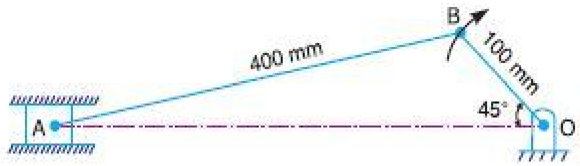
Q.3 A) PQRS is a four bar chain with link PS fixed. The lengths of the links are PQ=62.5 mm; QR=175 mm; RS =112.5 mm; and PS = 200 mm. The crank PQ rotates at 10 rad/s clockwise. Draw the velocity diagram when angle QPS = 60° and Q and R lie on the same side of PS. Find the angular velocity of links QR and RS. **(07)**

B) In **Q.3 A)** Draw acceleration diagram and find the angular acceleration of links QR and RS. **(08)**

OR

B) Locate all the instantaneous centres of the slider crank mechanism as shown in following figure. The lengths of crank OB and connecting rod AB are 100 mm and 400 mm respectively If the crank rotates clockwise with an angular velocity of 10 rad/s, find: **(08)**

1. Velocity of the slider A,
2. Angular velocity of the connecting rod AB.



Q.4 A) Derive the expression for velocity and acceleration of a piston. **(07)**

OR

A) Two plates of 7 mm thickness are connected by a double riveted lap joint of zigzag pattern. Calculate rivet diameter, rivet pitch and distance between rows of rivets for the joint. Assume allowable stress in tension=90MPa, allowable stress in shear = 60 MPa ,allowable strength in crushing = 120MPa (also assume strength in tension, crushing and shear are equal) **(07)**

B) Discuss ASME code for shaft design in detail **(08)**