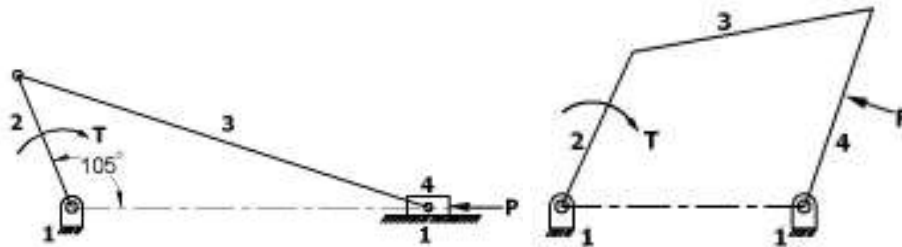


GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-III Regular / Remedial Examination December 2010****Subject code: 130103****Subject Name: Analysis of Mechanism & Machine Elements****Date: 18 /12 /2010****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

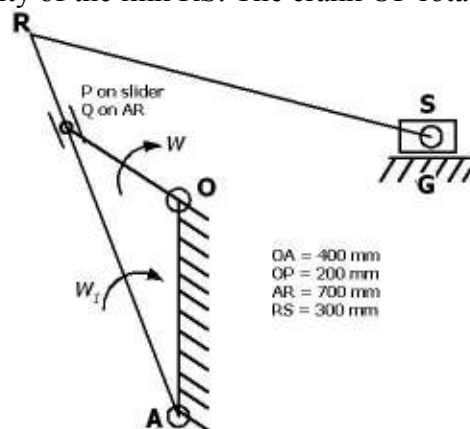
- Q.1**
- (a) Explain applied forces and constrained forces. **02**
 - (b) What are the conditions for a body to be in equilibrium under the action of (a) two forces (b) three forces, (c) two forces and torque. **04**
 - (c) Sketch the free body diagram of each part of the mechanisms shown the forces in proper locations and directions without magnitude. **08**

**Fig. 1**

- Q.2**
- (a) Explain off-set inertia force. Give the expression of the distance of this offset inertia force from C.G. **07**
 - (b) Differentiate between mechanism and machines. And define rigid body and resistant body. **07**

OR

- (b) Classify different types of kinematic pairs and draw sketches of all . **07**
- Q.3**
- (a) Fig. 2 shows the link mechanism of a quick return mechanism of the slotted lever type. For the configuration shown determine the velocity of the cutting tool at S and the angular velocity of the link RS. The crank OP rotates at 210 rpm. **09**

**Fig. 2**

- (b) Explain KLEIN'S construction. **05**

OR

- Q.3**
- (a) With help of neat sketches explain inversions of slider-crank mechanism. **07**
 - (b) Explain Kennedy's theorem. And define class-I and class-II mechanisms. **07**

- Q.4 (a)** What do you mean by piston effort and crank effort? Give their expression as per usual notations. **06**
- (b)** Deduce the expression of inertia force on the piston of a slider crank mechanism in terms of angular velocity of the crank, length of crank and connecting rod and mass of piston. **08**

OR

- Q.4 (a)** Explain dynamically equivalent system. **02**
- (b)** State D'Alembert's principle. How it helps in solving dynamic analysis problem? **02**
- (c)** The effective steam pressure on the piston of a vertical steam engine is 200 kN/m^2 when the crank is 40° from the inner dead centre on the down stroke. The crank length is 300 mm and the connecting rod length is 1200 mm. The diameter of the cylinder is 800 mm. What will be the torque on the crankshaft if the engine speed is 300 rpm and the mass of the reciprocating parts is 250 kg. **10**

- Q.5 (a)** Show that for transmitting same torque the weight per unit length is less in case of hollow shaft than solid shaft. **07**
- (b)** Give the expression of length of a square key in term of the diameter of the shaft assuming both key and shaft are of same material and width and thickness of the key is one-fourth of the shaft diameter. **07**

OR

- Q.5 (a)** Explain maximum principle and maximum shear stress theory. Mention the type material for they applied. **07**
- (b)** Two plates, each 5 mm thick, are connected by means of four rivets as shown in Fig. . Permissible stresses for rivets and plates in tension, shear and compression are 80 N/mm^2 , 60 N/mm^2 and 120 N/mm^2 respectively. Calculate (a) diameter of the rivets (b) width of the plate and (c) efficiency of the joint. **07**

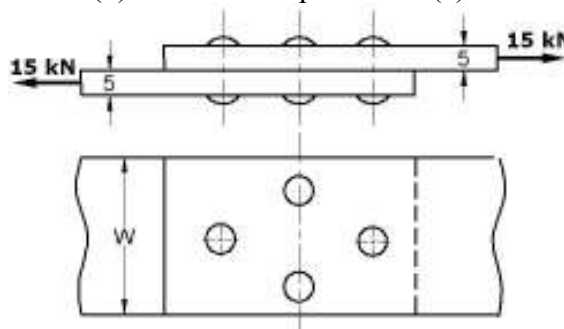


Fig. 3
