



Mansoura University
Faculty of Engineering
Textile Engineering Dept.
Third Year Textile -

Mechanics of Weaving Machines

Time: 3 hours
Date: 13 /1 /2013

Attempt the following questions (20 Marks/ question):

- (1) A- Draw -to a scale- and in a general position a 4-bar beating-up mechanism with the following dimensions:
- crank length = 10 cm.
 - connecting rod length = 30 cm.
 - sley sword length = 75 cm.
 - vertical distance bet. crank shaft and rocking shaft = 66 cm.
 - horizontal distance bet. crank shaft and rocking shaft = 27 cm.
- B- Determine:
- i - the angle through which the sley sword oscillates,
 - ii- length of connecting rod required to make the sley sword vertical at its front position,
 - iii- length of connecting rod required to make the sley sword vertical at its back position,
 - iv- average speed of the reed during its forward and backward strokes at 240 r.p.m of the crank shaft.
- (2) Determine picking distance, maximum speed and acceleration a shuttle weighing 400 gm can reach if the machine is operated at 225 p.p.m , rigidity of the picking mechanism is 5000 N/m, and the displacement of the picking cam (cm) is 20 times its angular displacement (rad.). Determine also the kinetic energy and the power consumed in picking.
- (3) Derive expressions and draw diagrams of displacement, velocity, and acceleration as functions of time for a double rigid rapier if machine speed = 400 p.p.m, and weaving width = 240 cm.
- (4) Considering the 4-bar beating- up mechanism as a slider mechanism with an equivalent sley mass concentrated at the connecting rod pin, derive expressions for beating acceleration, and beating force in terms of time. Draw the beating force- time diagram if crank length is 12 cm, connecting rod length is 32 cm, machine speed is 180 p.p.m and equivalent mass of sley is 30 kg.

- (5) Explain with neat sketches and calculations:
- (a) Simple Harmonic Motion, and
 - (b) Planetary Motion.
- (6) Express:
- (a) Projectile displacement, velocity, acceleration, and kinetic energy as functions of time during picking stage on Sulzer weaving machine.
 - (b) Weft average speed in terms of weft displacement in the shed on Air-jet weaving machine.
 - (c) Weft instantaneous speed in terms of time during flying in the shed on Air-jet weaving machine.
 - (d) Weft instantaneous acceleration in terms of time during flying in the shed on Air-jet weaving machine.
- (7) Determine:
- (a) Shuttle picking speed and angle if maximum vertical displacement during inserting a weft pick across a warp of 128- cm width is 1 cm.
 - (b) Length of picking arm and constant of torsion rod required to give projectiles a speed of 44 m/sec. if torsion angle is 0.5 rad.
 - (c) Average shuttle flying speed if shuttle length is 28 cm, reed width is 210 cm, weaving speed is 250 p.p.m., and flying angle is 160 degrees.

With my best wishes
Dr. Hamdy Ahmed Abd Allah Ebraheem