Code No: 154BF

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year II Semester Examinations, November/December - 2020
**KINEMATICS OF MACHINERY**
(Common to ME, MCT)

Time: 2 Hours   **Max. Marks: 75**

Answer any Five Questions
All Questions Carry Equal Marks
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1.a)   Explain the types of partially and completely constrained motions with examples.
  b)   In a slotted lever quick-return mechanism, the distance between fixed centres is 200mm
       and driving crank is 100mm long. Determine the ratio of the time taken on the cutting
       and return strokes.   [7+8]

2.a)   Sketch and explain any two inversions of double crank chain.
  b)   What is Grubbler's criterion for plane mechanisms and explain about the importance of
       inversion?   [7+8]

3.   In a pin jointed four bar mechanism ABCD, the lengths of the various links are
       AB = 30mm, BC=90mm, CD=55mm and AD=85mm. The link AD is fixed and angle
       BAD is 130°. If the velocity of 'B' is 2m/sec in clock wise direction, find a) velocity
       and acceleration of mid=point of link BC and b) Angular velocity of CB and CD. [7+8]

4.   The engine mechanism shown in figure crank OB = 60mm, length of connecting rod
       AB = 225mm. The CG of connecting rod is at G which is 75mm from B. The crank
       rotates at 200rpm. Find a) Velocity of G and angular velocity of AB. b) The acceleration
       of G.   [7+8]
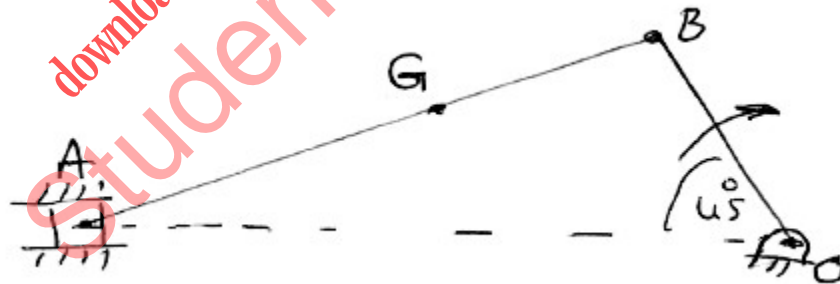
5.a)   Sketch and explain the principles of working of Ackerman's steering gear mechanism.
  b)   Two shafts are connected by Hooke's joint. The driving shaft rotates at 600rpm. If the
       total permissible variation in the speed of the driven shaft is not to exceed   ±5% of the
       mean speed, find the greatest permissible angle between the centre-lines of the shafts.
                                                                                                 [7+8]

6.a)   Sketch the principle of working of Scott-Russel straight line motion mechanism.
  b)   What are the conditions for correct steering and explain with a sketch the working of
       Ackerman's steering gear.   [7+8]

7. Draw the profile of CAM when the cam shaft diameter is 50mm, diameter of roller 20mm angle of lift 100^0, angle of fall is 130^0, lift of the follower is 35mm. The number of dwells are two of equal interval between rotations. During lift, the motion is SHM and during fall the motion is uniform acceleration and deceleration. If the speed of cam shaft is 600 rpm, find maximum velocity and acceleration during lift. [15]

8. Two 20^0 full-depth involute gears having 40 and 64 teeth are in mesh. The pinion rotates at 900rpm. The module is 4mm. Find the sliding velocities at the engagement and at the disengagement of a pair of teeth and contact ratio. If the interference is just avoided. Find: a) The addendum on the wheel and pinion. b) The path of contact. c) The maximum velocity of sliding at engagement and dis-engagement of a pair of teeth d) Contact ratio. [4+4+4+3]

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