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Subject Code

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Question Type

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Question Number

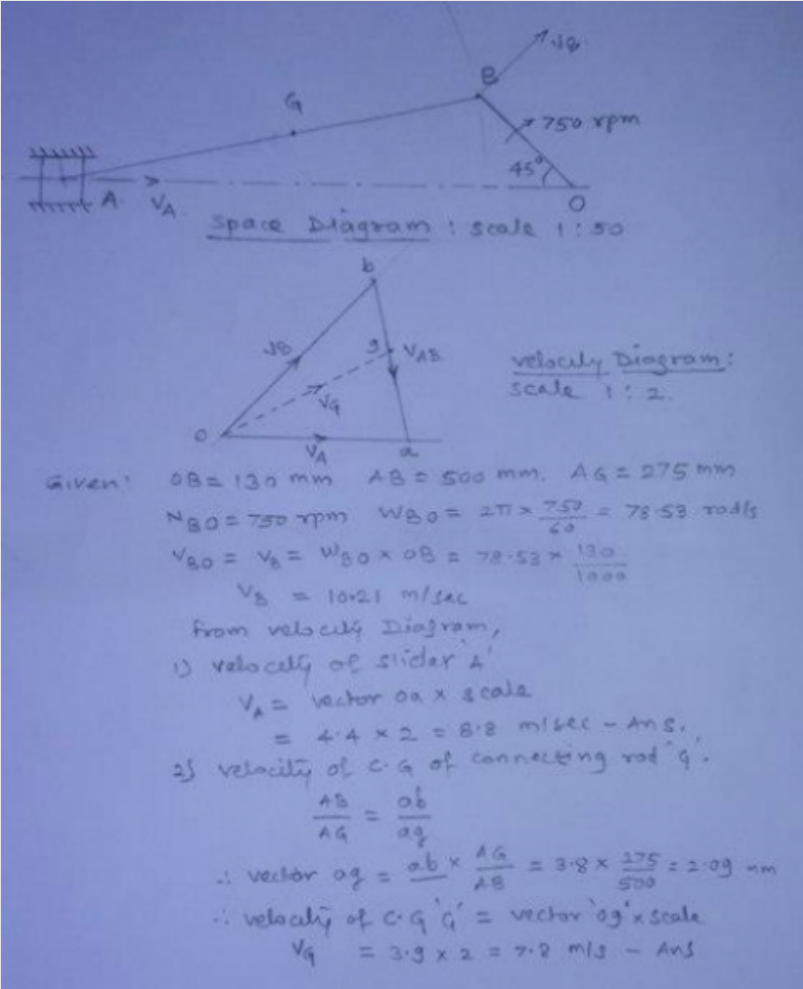
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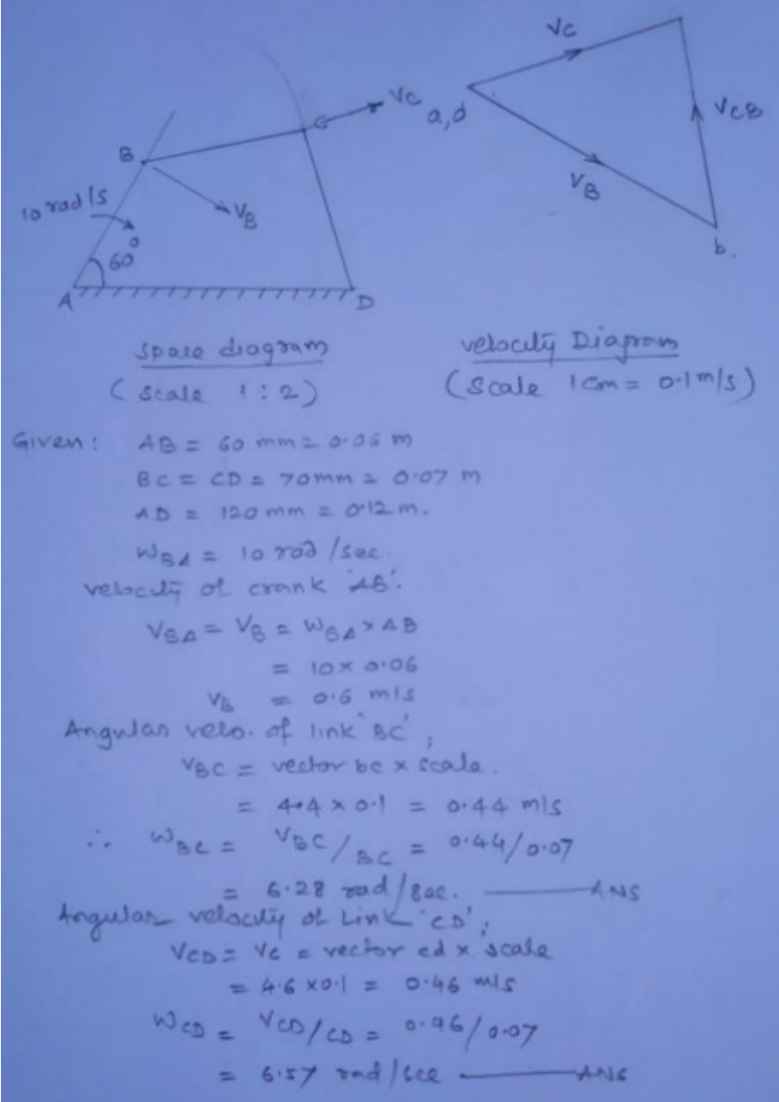
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Examination: [2017 SUMMER](#)

Que.No	Question/Problem	marks	Link
Q 3 c)	<p>Question: In slider crank mechanism, the length of crank OB and connecting rod AB are 130 mm and 500 mm respectively. The centre of gravity G of the connecting rod is 275 mm from slider A. The crank speed is 750 rpm in clockwise. When crank has turned 45° from inner dead centre position determine (i) velocity of slider 'A' (ii) velocity of centre of gravity of connecting rod 'G'.</p> <p>Answer:</p>  <p>Space Diagram : scale 1 : 50</p> <p>velocity Diagram : scale 1 : 2.</p> <p>Given: $OB = 130 \text{ mm}$ $AB = 500 \text{ mm}$ $AG = 275 \text{ mm}$ $N_{BO} = 750 \text{ rpm}$ $\omega_{BO} = \frac{2\pi \times 750}{60} = 78.53 \text{ rad/s}$ $v_{BO} = v_B = \omega_{BO} \times OB = 78.53 \times \frac{130}{1000}$ $v_B = 10.21 \text{ m/sec}$ From velocity Diagram, 1) velocity of slider 'A' $v_A = \text{vector } oa \times \text{scale}$ $= 4.4 \times 2 = 8.8 \text{ m/sec} - \text{Ans.}$ 2) velocity of C.G. of connecting rod 'G'. $\frac{AG}{AB} = \frac{og}{ob}$ $\therefore \text{vector } og = \frac{ag}{AB} \times \frac{ob}{AB} = 3.8 \times \frac{275}{500} = 2.09 \text{ m/sec}$ $\therefore \text{velocity of C.G. 'G'} = \text{vector 'og' } \times \text{scale}$ $v_G = 2.09 \times 2 = 4.18 \text{ m/s} - \text{Ans}$</p>	4	view

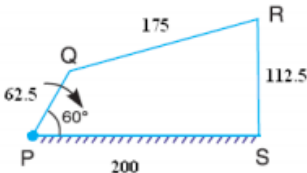
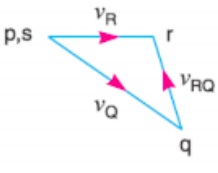
Que.No	Question/Problem	marks	Link
Q 4 b)	<p>Question: In a four bar mechanism ABCD link AD is fixed and the crank AB rotates at 10 radians per second in clockwise, lengths of the links are AB = 60 mm, BC = CD = 70 mm, DA = 120 mm, when angle DAB = 60° and both B and C lie on the same side of AD, find angular velocities of BC and CD link.</p> <p>Answer:</p>  <p><u>Space diagram</u> (Scale 1 : 2)</p> <p><u>velocity Diagram</u> (Scale 1cm = 0.1 m/s)</p> <p>Given: AB = 60 mm = 0.06 m BC = CD = 70 mm = 0.07 m AD = 120 mm = 0.12 m. $\omega_{BA} = 10 \text{ rad/sec}$ velocity of crank 'AB'. $V_{BA} = V_B = \omega_{BA} \times AB$ $= 10 \times 0.06$ $V_B = 0.6 \text{ m/s}$ Angular velo. of link 'BC', $V_{BC} = \text{vector } bc \times \text{scale}$ $= 4.4 \times 0.1 = 0.44 \text{ m/s}$ $\therefore \omega_{BC} = V_{BC} / BC = 0.44 / 0.07$ $= 6.28 \text{ rad/sec.} \text{ ---ANS}$ Angular velocity of link 'CD', $V_{CD} = V_C = \text{vector } cd \times \text{scale}$ $= 4.6 \times 0.1 = 0.46 \text{ m/s}$ $\omega_{CD} = V_{CD} / CD = 0.46 / 0.07$ $= 6.57 \text{ rad/sec ---ANS}$</p>	4	view

Que.No	Question/Problem	marks	Link
Q 6 f)	<p>Question: Four masses A, B, C and D are attached to a shaft and revolve in the same plane. The masses are 12 kg, 10 kg, 18 kg and 15 kg respectively and their radii of rotations are 40 mm, 50 mm, 60 mm and 30 mm. The angular position of the masses B, C and D are 60°, 135° and 270° from the mass 'A'. Find the magnitude and position of the balancing mass at a radius of 100 mm. Use graphical method only.</p> <p>Answer:</p> <p>Centrifugal force of each mass</p> $m_1 r_1 = 12 \times 0.04 = 0.48 \text{ kg-m}$ $m_2 r_2 = 10 \times 0.05 = 0.50 \text{ kg-m}$ $m_3 r_3 = 18 \times 0.06 = 1.08 \text{ kg-m}$ $m_4 r_4 = 15 \times 0.03 = 0.45 \text{ kg-m}$ <p>Balancing force is proportional to $m r = \text{vector } ae$ $\therefore m \times 0.1 = 0.75 \text{ kg-m}$ $\therefore m = 7.5 \text{ kg} \dots \text{Ans.}$</p> <p>$\theta = \text{Angle of inclination of the balancing mass from the horizontal mass } 12 \text{ kg}$ $\therefore \theta = 87^\circ \text{ (clockwise)} \dots \text{Ans.}$</p> <p>a) Space Diagram.</p> <p>b) Vector Diagram.</p>	4	view

Examination: [2016 SUMMER](#)

Que.No	Question/Problem	marks	Link
Q 3 a)	<p>Question: In a slider-crank mechanism, the crank is 480 mm long and rotates at 20 rad/sec in the counter-clockwise direction. The length of the connecting rod is 1600 mm. when the crank turns 60° from the inner-dead centre. Determine the velocity of the slider by relative velocity method.</p> <p>Answer:</p> <p>Q 3(a) Slider Crank mechanism Crank = 480 mm long = $OA = 0.480$ m Connecting rod = 1600 mm long = AP $\omega_{AO} = 20$ rad/s</p> <p>scale 1:20 [1 Mark]</p> <p>$v_{AO} = \omega_{AO} \times AO$ $= 20 \times 0.480$ $= 9.6$ m/s</p> <p>[2 Marks]</p> <p>velocity diagram scale $1 \text{ m/s} = 1 \text{ cm}$</p> <p>Velocity of slider = $v_{PO} = \vec{PO} = 9.5$ m/s [1 mark]</p>	4	view

Examination: [2015 SUMMER](#)

Que.No	Question/Problem	marks	Link
Q 3 e)	<p>Question: PQRS is a four bar chain with PS fixed length of links are PQ = 62.5 mm, QR = 175 mm, RS = 112.5 mm, PS = 200 mm. The crank PQ rotate at 10 rad/sec. in clockwise direction. Determine the angular velocity of point R, graphically by using relative velocity method.</p> <p>Answer:</p> <p>Assume angle QPS = 60°</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> (a) Space diagram. (b) Velocity diagram. </div> <p style="margin-top: 20px;"> $V_{QP} = PQ \times \omega_{pq} = 0.0625 \times 10 \text{ rad / sec} = 0.625 \text{ m/s}$ </p> <p>First of all, draw the space diagram to some suitable scale, as shown in Fig. Now the velocity diagram, as shown in Fig. is drawn as discussed below :</p> <ol style="list-style-type: none"> Since the link PS is fixed, therefore points p and s are taken as one point in the velocity diagram. Draw vector p_q perpendicular to QP to some suitable scale, to represent the velocity of Q with respect to P or simply velocity of Q (i.e. V_{qp} or V_q) such that vector p_q = $V_{qp} = V_q = 0.625 \text{ m/s}$ Now from point q, draw vector q_r perpendicular to RQ to represent the velocity of R with respect to Q (i.e. V_{rq}) and from point s, draw vector s_r perpendicular to RS to represent the velocity of R with respect to S or simply velocity of R (i.e. V_{rs}, or V_r). The vectors q_r and s_r intersect at r <p>By measurement, we find that</p> <p style="text-align: center;">$V_{rs} = V_r = \text{vector } sr = 0.43 \text{ m/s}$</p> <p>We know that $RS = 112.5 \text{ mm} = 0.1125 \text{ m}$</p> <p>$\therefore$ Angular velocity of R = Ang. Velo. of link RS (clockwise about S)</p> $\omega_{RS} = \frac{V_{rs}}{RS} = \frac{0.43}{0.1125} = 3.82 \text{ rad/s} \quad \text{Ans.}$	4	view