



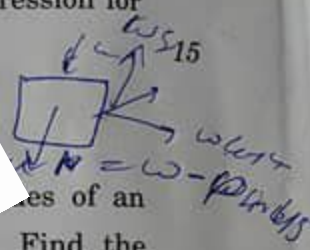




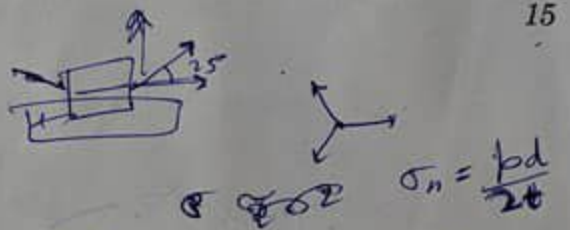
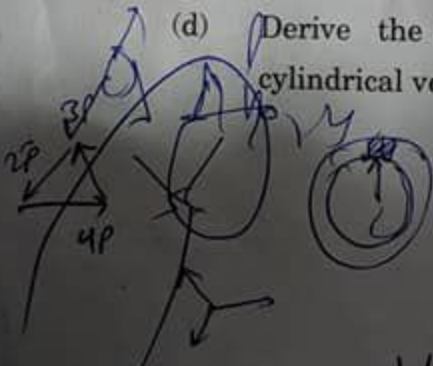
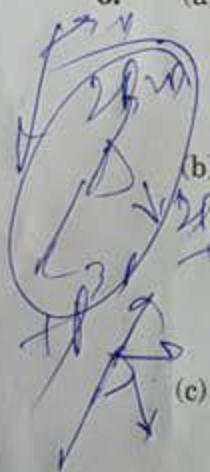


5. (a) Give the classification of kinematic pairs. 15
- (b) An engine, running at 150 r.p.m., drives a line shaft by means of a belt. The engine pulley is 750 mm diameter and the pulley on the line shaft being 450 mm. A 900 mm diameter pulley on the line shaft drives a 150 mm diameter pulley keyed to a dynamo shaft. Calculate the speed of the dynamo shaft, when (i) there is no slip, and (ii) there is a slip of 2% at each drive. 15
- (c) Mention the comparison between involute and cycloidal gears. 15
- (d) Explain the term height of the governor. Derive an expression for the height in the case of a Watt governor. 15

$P_1 N_1 = P_2 N_2 = P_3 N_3$



6. (a) Three forces of 2P, 3P and 4P act at the vertices of an equilateral triangle of side 'a'. Find the magnitude and position of the resultant. 15
- (b) A body of weight W is pushed across a rough horizontal plane having a coefficient of friction  $\mu$ . Find the magnitude of the force, applied at an angle of  $25^\circ$  with the horizontal, while acting at an angle of  $25^\circ$  with the horizontal. 15
- (c) Derive the expression for the shear stress in a circular shaft subjected to torsion. 15
- (d) Derive the expression for circumferential stress in a thin cylindrical vessel. 15



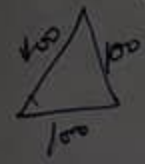
SJE/2018

$$\sigma_h = \frac{p(\pi d^2)}{4t} = \frac{p(\pi d t)}{2 \times 30}$$

$$\sigma_n = \frac{pd}{2t}$$

$$p \times \frac{\pi d^2}{4} = \sigma \times \pi d t$$

$$\frac{pd^2}{4t} = \sigma$$



2t