Problems for drilling

Problem 1

In a drilling operation:

Hole diameter =30 mm Hole depth = 100 mm Cutting speed = 300 r.p.m Feed = 0.25 mm/rev Specific cutting resistance = 2000 N/mm²

Calculate:

- a- The chip area.
- b- The main cutting force.
- c- Machining time.
- d- Material removal rate.

Problem 2

In a drilling operation using a twist drill, the lip angle is 120 degree (standard), the spindle speed is 300 rpm, the feed is 0.2 mm/rev and the drill diameter is 10 mm. Calculate:

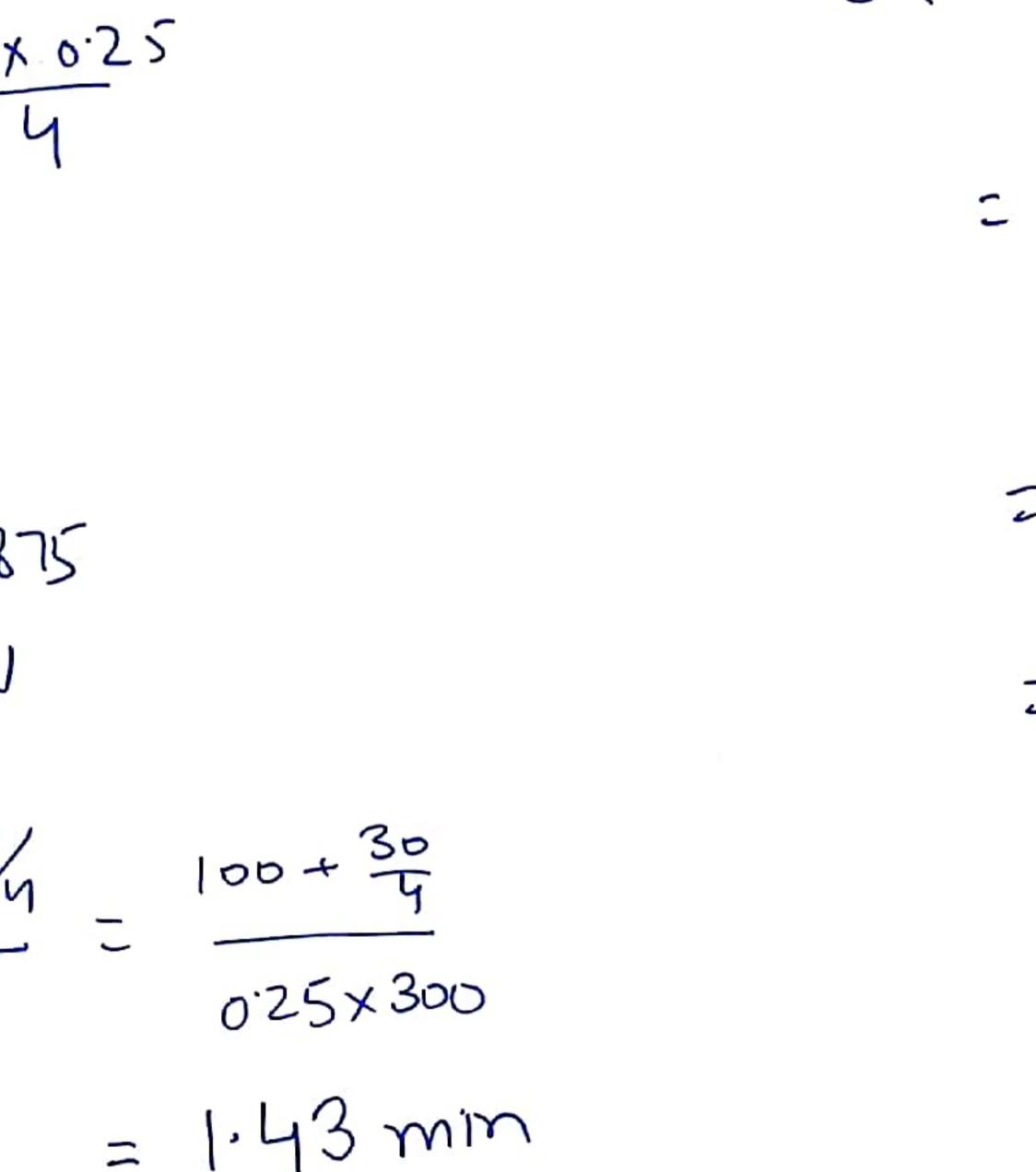
- a the machining time to drill a through hole 30 mm long.
- b the drill torque in [N-m] assuming that specific cutting resistance for the work. material is 200 Kg/mm².
- c the amount of material removed in the first 10 sec after full engagement of drill.
- d the cutting power if cutting force is 2000 N.

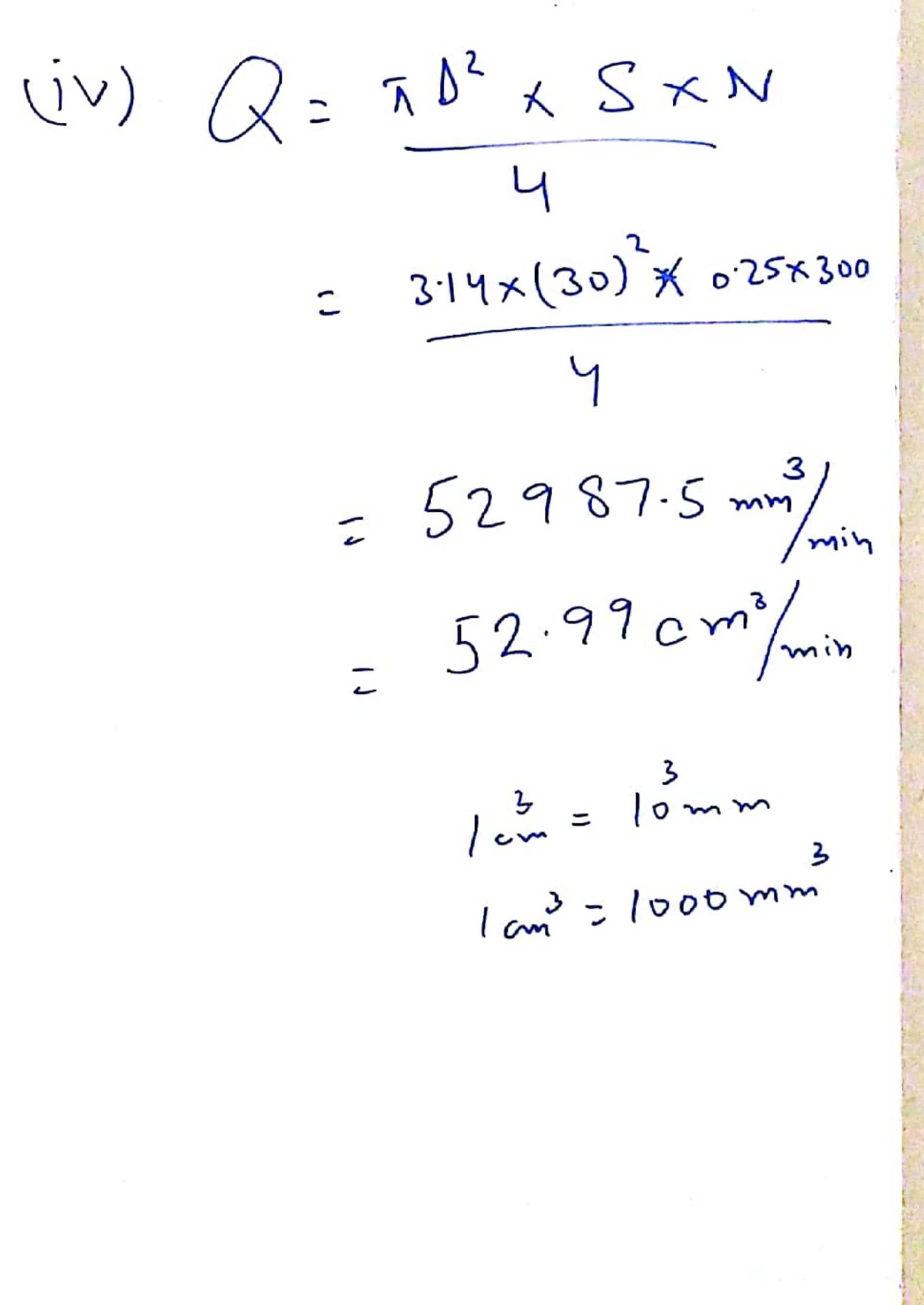
Problem 3

A drilling operation is used to drill a 11 mm diameter hole to a certain depth. It takes 4.5 min to perform the drilling operation using high-pressure fluid delivery of coolant to the drill point. The cutting conditions are N = 300 rev/min at a feed = 0.254 mm/rev. To improve the surface finish in the hole, it has been decided to increase the speed by 20% and decrease the feed by 25%. How long will it take to perform the operation at the new cutting conditions?

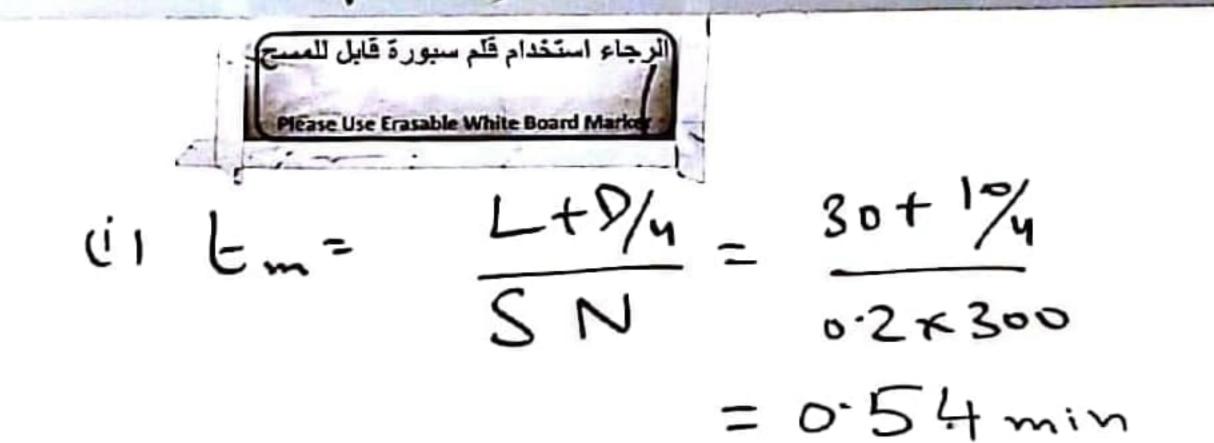
Problem 1: Drilling D= 30mm = 100mm N= 300 × pm F=S=0.25mm/ver K= 2000 N/mm² $(i) A=?, (ii) P_{s}=? (iii) E_{n}=?$ (11) MRR - Q = 7

Please Use Erasable White Board Marker $(i)A = \frac{D}{2} \times \frac{S}{2} = \frac{30 \times 0.25}{4}$ A = 1.875 mm² (1) $P_s = K_s A$ $P_s = 2000 \times 1.875$ = 3750 N $L + \frac{1}{4} = \frac{100 + \frac{39}{4}}{4}$ SN





a . drilling Prob.2 N= 300 rpm F= S= 0.2 mm/rev, D=10mm L = 30mm, Ks= 200kg/mm² tm=7. M=7 MRR=7. after 10 sec 1 m=7 1+ + T s= 20001



= 10 Nm

60 sec - 4.172 cm 1 sec - 4.172 = 0.54 min in 10 sec - 4.172 X 10 60 (ii) $M = P_S \times P_Z = 2ddd \times \frac{10m}{2x1ddy}$ =0785cm m= KsxV = P3x ADN (III) Q=MRR = TD2 X SXN = 2000 x314x10x300 = 3.14 × 102 × 0.2 × 300 1000 60 14 Watts 0 4712:38 mm3/min 4.712 m/rm

 $\frac{Problem}{N=300}, \frac{3}{f} = 0.254 \, mm/rei$ New f=0.254-0.25×0.254 =0.1905 mm/ren tm=7, increase spood by 20%. and decrease feed by 25%. New Im = 340.15+ 11/4 0.1905 X 360 $t_{m} = L + \frac{D4}{3} = 4.5 = L + \frac{11}{4}$ tom = 5 mils. 0.254x300/ $= 1 L = 4.5 \times 0.254 \times 300 - \frac{11}{4}$ L = 340.15 mm New N= 300+0.2x 300 N = 360

