* AUTOMATION AND ROBOTICS:

- High speed with slight error → Stepper motor
- feed → Servo motor (less speed)

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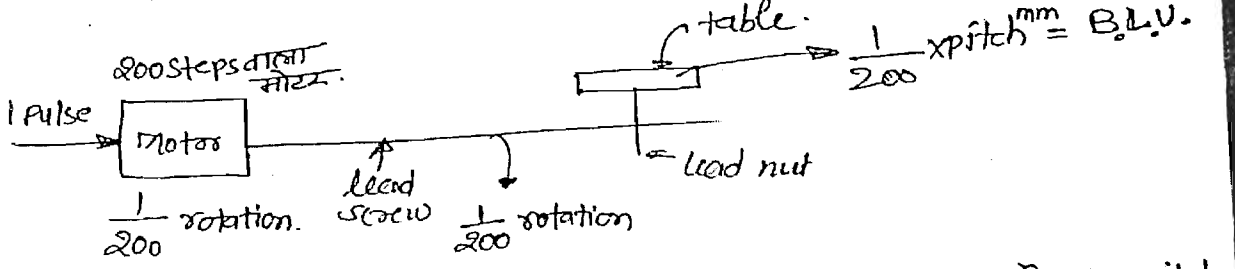
* BLU:

Movement of the table corresponding to one pulse recieved by the motor is Basic length Unit (BLU).

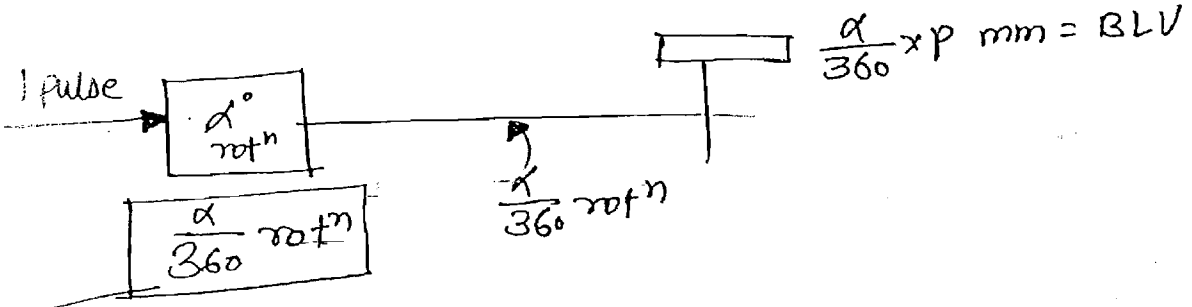
उदाहरण १:



in 1 rotation table moves 1 pitch hence in $\frac{1}{200}$ rot^n = $\frac{1}{200}$ x pitch

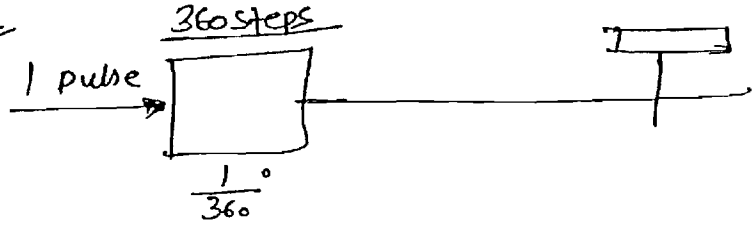
$\frac{1}{200} \times P$ mm ⟶ $\frac{1}{200} \times P \times 1000$ um = BLU.

उदाहरण २:



→ Reciprocal of this is number of steps in motor.

497

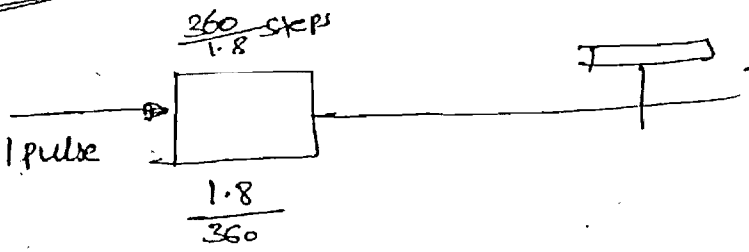


$\frac{1}{360} \times 3.6 = \frac{1}{100}$ mm

$= 10\mu m$

$P = 3.6$ mm

Q or P:

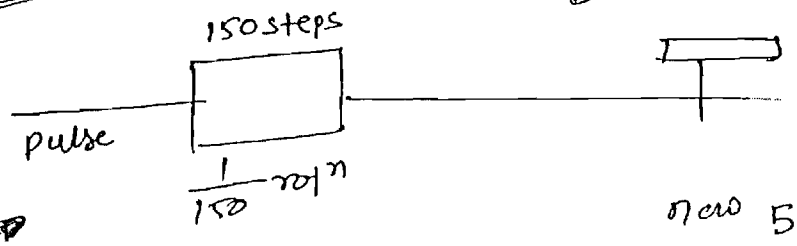


$\frac{1.8}{360} \times z = \frac{1}{100}$

$z = \frac{180}{1.8} = 100$

$= 10\mu m$

Q08 P1:



$BLU = \frac{1}{150} \times 4 = 26.66\,\mu m$

for speed

$\frac{1}{150} \times 200 \times 4$

$= \frac{8}{1.5}$

$= 5.333$

new $5.333 \times 60 = 320$ mm/min

जुगाड़ :- If frequency of pulse is 1000 Hz इसका मतलब 1 sec में 1000 pulse भेजेंगे / इसका मतलब 1 मिनट 1000×60 pulse भेजेंगे / उससे $1000 \times 60 \times$ BLU mm/mm. टेबल का movement होगा / therefore table velocity or feed $1000 \times 60 \times BLU$ mm/min.

Eg: for 200 steps

∴ ~~स्पीड~~ = 200 pulse से 1 rotation,

1 " " — $\frac{1}{200}$ rotation,

1000×60 " — $\frac{1}{200} \times 60 \times 1000$ rotn

∴ RPM = $\frac{1}{200} \times 1000 \times 60$ $\frac{\text{rotation}}{\text{min.}}$

फुगाउ 4: If motor rotates at 500 rpm मतलब 1 मिनेट में 500 rotations हुआ / मतलब टेबल velocity (feed)

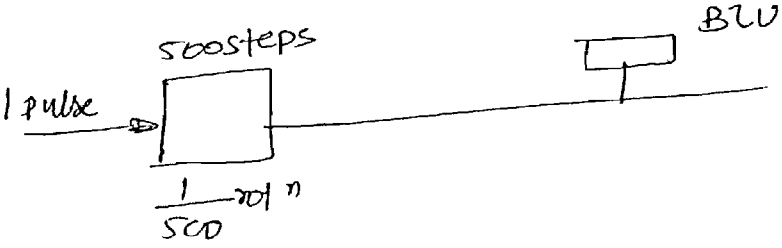
$= 500 \times P$ mm/min

मतलब 200 x 500 pulse/min bheja. (eg: pulse = 200)

$\therefore \frac{200 \times 500}{60}$ pulse/s (or Hz) भेना।

EXAMPLE: 500 pulse/revolution → 500 steps वाला मोटर

$\therefore \frac{1}{500}$ = Rotation, BLU = $\frac{1}{500} \times 5 = 10\,\mu m$



N = 600 rpm, $\therefore$ velocity = 600 x 5 = 3 m/min

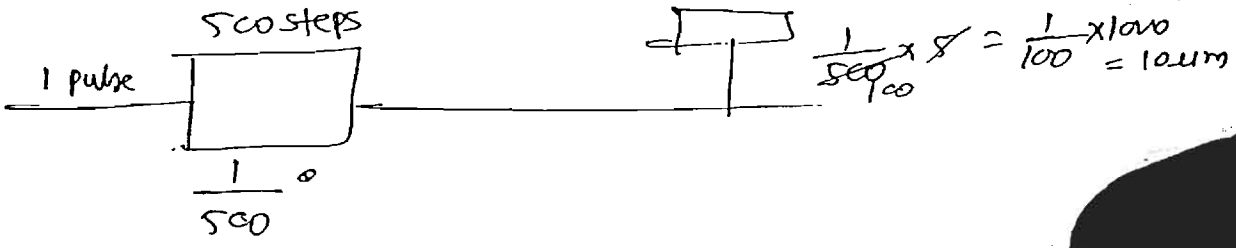
→ for 600 rpm and (500 pulse for 1 rotn/min)

$\therefore \frac{600 \times 500}{60}$ pulse/sec or Hz

frequency = 5000 Hz

IFS 2015

steps 500



∴ linear velocity = 650 × 5 = 3.25 m/min

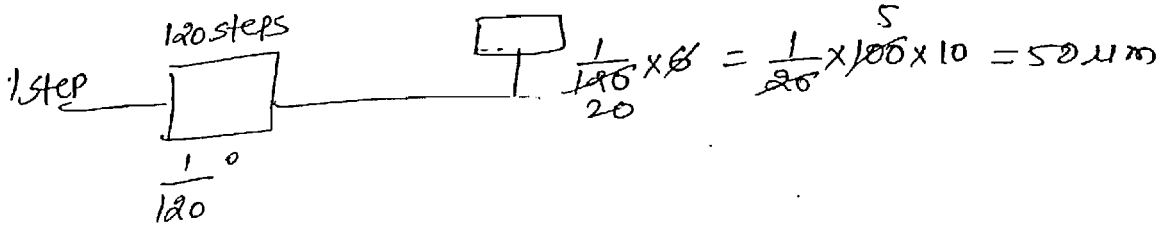
frequency = $\frac{650 \times 500}{60}$ = 5416.66 Hz (or. pulse/sec)

ESE 2011

1000 pulse/sec p = 6 mm rpm = 500 rpm

∴ frequency = $\frac{\text{Pulse/rev.} \times \text{rpm}}{60}$ = 1000

∴ $\frac{\text{pulse}}{\text{rev}} = \frac{1000 \times 60}{500} = 120 \frac{\text{pulse}}{\text{rev}}$



∴ linear velocity = 500 × 6 = 3 m/min

frequency = 1000 pulse/sec

जुगाड 5 अगर answer pulse होना है तो हमे उतना गणित लगाना है। पहले हम BLU calculate करेंगे। Let BLU = 5 μm

- 0.005 mm movement के लिए 1 pulse भेजना। (BLU)
- 1 mm movement के लिए $\frac{1}{0.005}$ pulse भेजना।
- टेबल को x mm movement के लिए $\frac{x}{0.005}$ pulse भेजना।
- Table velocity या feed 100 $\frac{mm}{min}$ movement के लिए

$$\frac{100}{0.005} \text{ pulse/min}$$

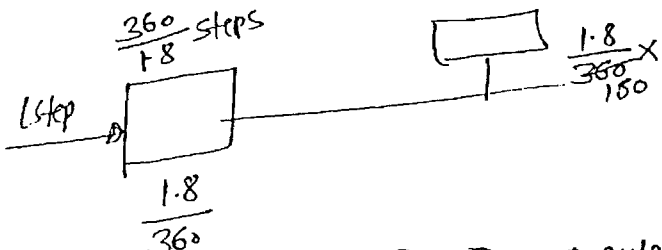
$$= \frac{100}{0.005 \times 60} \text{ pulse/sec}$$

Q10 PI BLU = 0.005 mm, pitch = 5 mm, 9 mm movement

0.005 mm के लिए 1 pulse → 9 mm के लिए $\frac{9}{0.005} = \frac{18}{0.01}$

= 1800 pulse भेजना

Q18



∴ 0.001 mm के लिए 1 pulse → 50 mm के लिए

$\frac{50}{0.001}$ pulse

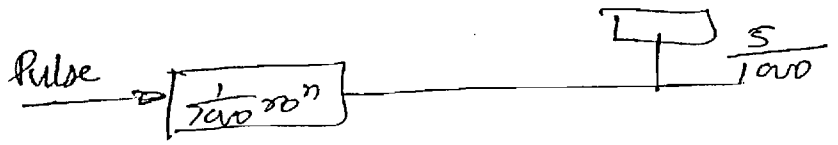
= 50000 pulses भेजना पड़ेगा

Q16 $P = 5$ mm, table speed = 6 m/min

$\therefore$ $5 \times S = 6$ m/min (rpm)

$$rpm = \frac{6000}{5} = 1200 \text{ rpm}$$

$$\frac{1200 \times}{60} = 1000$$



$\therefore$ 0.005 mm $\longrightarrow$ 1 pulse

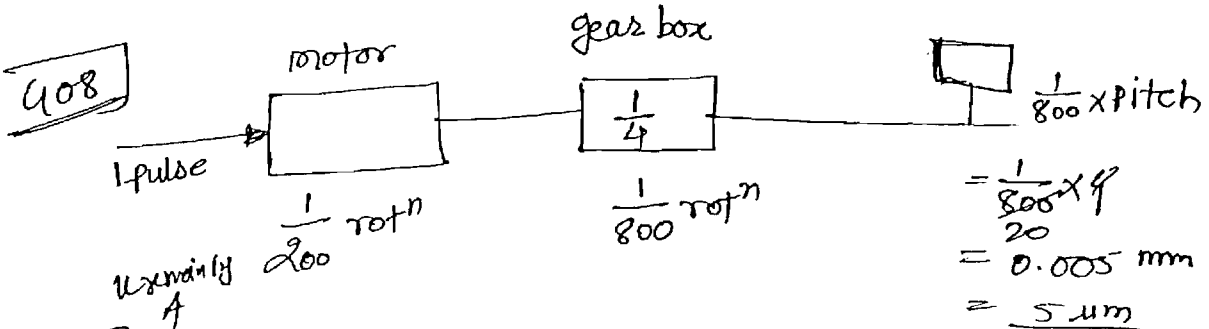
1 mm $\longrightarrow$ $\frac{1}{0.005}$ pulses

$\therefore$ 6000 mm/min $\longrightarrow$ $\frac{6000}{0.005}$ pulse/min

$= \frac{6000}{0.005 \times 60}$ pulse/sec.

$= 20{,}000$ Hz $= 20$ kHz

Q08



10/73 table velocity = 10000×5 μm/min = 50 mm/min

table velocity = 10000×10

$= 5000 \times 10$ μm/min = 50 mm/min