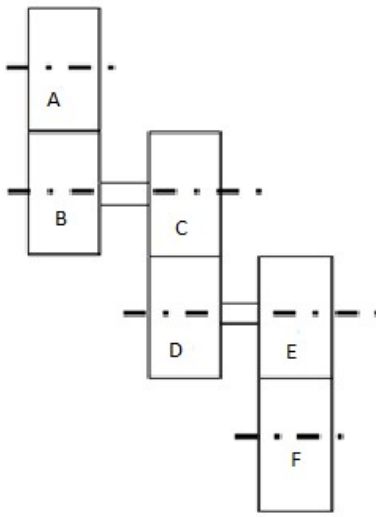
8. A compound gear train consists of six gear wheels A, B, C, D, E & F. A is the driver gear and F is the driven gear having 100 and 16 teeth respectively. Gear A meshes with gear B and gear B & C are mounted on the same shaft. Gear C has 80 teeth and meshes with gear D. Gears D & E are mounted on the same shaft and gear E meshes with gear F. The velocity ratio from gear A to F is 64 and the velocity ratio from A to B is equal to the velocity ratio from C to D and E to F. Determine the number of teeth for gears B, D & E. If the circular pitch of the gears is 2π determine the centre distance between the driver and driven shafts.



T_A = 100 T_C = 80 T_F = 16

T_B =?, T_D =? T_E = ?

$$\frac{N_F}{N_A} = 64, \qquad \frac{N_F}{N_A} = \frac{N_B}{N_A} X \frac{N_D}{N_C} X \frac{N_F}{N_E}, \qquad \frac{N_B}{N_A} = \frac{N_D}{N_C} = \frac{N_F}{N_E}$$

$$64 = \left[\frac{N_B}{N_A}\right]^3, \qquad \frac{N_B}{N_A} = 4$$

$$\frac{N_B}{N_A} = \frac{T_A}{T_B} \qquad 4 = \frac{100}{T_B}$$ **$T_B = 25$**

$$\frac{N_D}{N_C} = \frac{T_C}{T_D} \qquad 4 = \frac{80}{T_D}$$ **$T_D = 20$**

$$\frac{N_F}{N_E} = \frac{T_E}{T_F} \qquad 4 = \frac{T_E}{16}$$ **$T_E = 64$**

Circular Pitch = Π (d/T), = Π m = 2Π

m = 2, m = (d/T)

D_A = 2X100 =200mm, D_B = 2X25 = 50mm, D_C= 2X80 = 160mm, D_D = 2X20 = 40mm

D_E = 2X64 =128mm, D_F = 2X16 = 32mm

Centre distance = 200/2 +50/2 + 160/2 +40/2 +128/2 + 32/2 = **305 mm**

9. Gears with the following parameters are available. Gear A has a module of 2 and 50 teeth, Gear B has a diameter of 201mm and 67 teeth, Gear C has a module of 4 and diameter of 152mm, Gear D has a diameter of 50mm and 25 teeth, Gear E has a module of 3 and 100 teeth, Gear F has a module of 4 and is 360mm in diameter, Gear G has a module of 3 and diameter of 126mm, Gear H has a diameter of 60mm and 30 teeth, Gear I has 55teeth and a diameter of 110mm.Determine an arrangement to obtain the maximum possible speed for the driven shaft using compound gear train if the power is to be transmitted using 4 shafts. If the driver gear rotates at 200rpm, determine the speed of the driven shaft. Also mention the conditions used and sketch the arrangement of gear train.

Since only 4 shafts are to be used, 3 pairs or 6 gear wheels are required.

For maximum velocity ratio driver gear should have more number of teeth as compared to driven gear and meshing gears should be of the same module.

GEAR	MODULE	PCD	NO. OF TEETH
A	2	**100**	50
B	**3**	201	67
C	4	152	**38**
D	**2**	50	25
E	3	**300**	100
F	4	360	**90**
G	3	126	**42**
H	**2**	60	30
I	**2**	110	55

m=2

A=50, D=25, H=30, I=55

55/25= 2.2

55/30= 1.83

50/25=2

50/30=1.67

m=3

B=67, E=100, G=42

100/42= 2.38

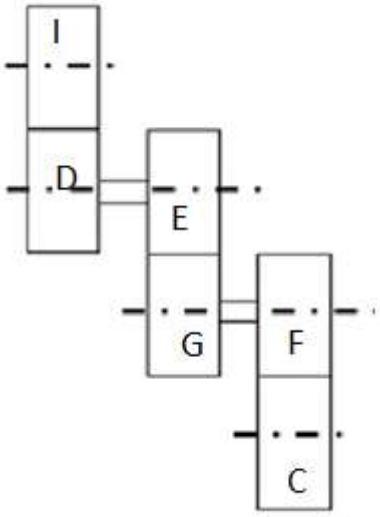
67/42=1.59

m=4

C=38, F=90

90/38= 2.37

Select the highest ratios from the above calculations.



$$\frac{N_C}{N_I} = \frac{T_I}{T_D} X \frac{T_E}{T_G} X \frac{T_F}{T_C}$$

$$\frac{N_C}{N_I} = \frac{55}{25} X \frac{100}{42} X \frac{90}{38}$$

= 12.4

$N_C = N_I \times 12.4$

= 200x12.4

= 2480 RPM