

Unit 3 - Week 2

Course outline

How to access the portal

Week 1

Week 2

- Lecture 6: Numerical Problem Milling of Helical Gears
- Lecture 7: Simple and Compound Indexing
- Lecture 8: Differential Indexing
- Lecture 9: Helical Gear Cutting on Milling Machine
- Lecture 10: Numerical Problems on Gear Milling
- Quiz : Week 2 Assignment 2
- Gear cutting by differential indexing on milling machine
- Week 2 Assignment 2 solution
- Feedback for Week 2

Week 3

Week 4

Correct answers to the exam questions

Week 2 Assignment 2

The due date for submitting this assignment has passed.

Due on 2017-08-11, 22:00 IST.

Submitted assignment

1) **A spur gear with 46 teeth, 2.5 module has to be cut on a column and knee type horizontal milling machine 1 point with a rotary disc type form gear milling cutter. The 2.5 module cutter no. 3 is used on a blank with outside diameter of 120 mm. Index crank rotation is 20/23 rotations. However, after cutting, it is found that the chordal thickness of the gear teeth is less than the correct value. A possible reason could be**

- Option (a) : Incorrect choice of cutter
- Option (b) : Incorrect choice of outside diameter
- Option (c) : Incorrect choice of depth of cut
- Option (d) : Incorrect choice of index crank rotation

No, the answer is incorrect.

Score: 0

Accepted Answers:

Option (c) : Incorrect choice of depth of cut

2) **A horizontal column and knee type universal milling machine is to be set up for cutting the teeth of a straight spur gear by differential indexing, using a rotary, disc type, form gear milling cutter. In that case, 1 point**

- Option (a) : The machine table longitudinal feed screw will need to be connected by gear train to the index plate of the indexing head
- Option (b) : The table will have to be rotated about a vertical axis by the angle $2\pi/Z$, where Z is the number of teeth to be cut
- Option (c) : The index plate of the indexing head will not be allowed to rotate
- Option (d) : None of the others

No, the answer is incorrect.

Score: 0

Accepted Answers:

Option (d) : None of the others

3) **During the milling of straight spur gear teeth by rotary disc type form gear milling cutter on a column and knee type milling machine, the following attachment/equipment/ mechanism is necessary 1 point**

- Option (a) : Taper turning attachment
- Option (b) : Grinding attachment
- Option (c) : Indexing head
- Option (d) : Whitworth mechanism
- Option (e) : None of the others

No, the answer is incorrect.

Score: 0

Accepted Answers:

Option (c) : Indexing head

4) **A straight spur gear of 35 teeth needs to be cut on a milling machine with the help of indexing head. The number of rotations to be provided at the index crank for the purpose of indexing, is nearest to 1 point**

- Option (a) : 35/40
- Option (b) : 40/35
- Option (c) : 1/35
- Option (d) : 40
- Option (e) : None of the others

No, the answer is incorrect.

Score: 0

Accepted Answers:

Option (b) : 40/35

5) **During milling of one straight spur gear tooth (Fig. 1) total length of travel of involute cutter depends on 1 point**

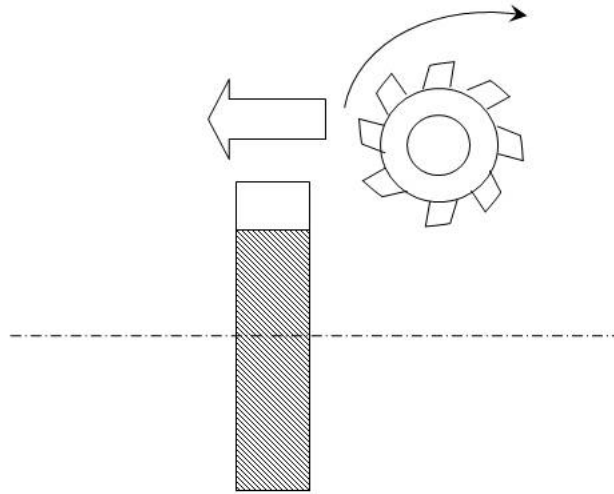


Fig. 1

- Option (a) : Diameter of the cutter
- Option (b) : Only on depth of cut
- Option (c) : Only on width of the gear blank
- Option (d) : none of these

No, the answer is incorrect.

Score: 0

Accepted Answers:

Option (a) : *Diameter of the cutter*

6) A right hand helical gear of normal module 4 and 30 teeth has to be cut with helix angle 15 degrees on a 1 point column and knee type universal milling machine with a rotary disc type form gear milling cutter. The longitudinal feed screw has a pitch of 5 mm. For this case, the gear ratio of the change gears leading from the longitudinal feed screw to the index plate is nearest to

- Option (a) : 4/3
- Option (b) : 0.1373
- Option (c) : 0.1456
- Option (d) : 1.159
- Option (e) : None of the others

No, the answer is incorrect.

Score: 0

Accepted Answers:

Option (b) : *0.1373*

7) A right hand helical gear of normal module = 4 and 125 teeth has to be cut with helix angle 15 degrees on a 1 point column and knee type universal milling machine with a rotary disc type form gear milling cutter. The choice of the cutter number (Table 1) will be

Table 1

Cutter Nos.	Cuts Spur Gear teeth from
1	135 teeth to rack
2	55-134
3	35-54
4	26-34
5	21-25
6	17-20
7	14-16
8	12-13

- Option (a) : 1
- Option (b) : 2
- Option (c) : 3
- Option (d) : 4

No, the answer is incorrect.

Score: 0

Accepted Answers:

Option (a) : 1

8) A set-up (Fig. 2) comprising of an indexing head H with differential change gears U is used to change the *1 point* angular inclination of an anti-aircraft gun barrel as shown. There is only 1 circular row of holes on the index plate with 83 holes having equal angular separation from each other. The differential change gear U connects up the worm gear shaft WGS (of indexing head) to the rotatable index plate with the help of shaft OS and bevel gears (not shown). U has a ratio (output rpm/input rpm) of $4 \times 40/83$. A clockwise rotation of index crank causes a clockwise rotation of index plate and vice versa. In such a configuration, the smallest measurable angle by which the anti aircraft gun barrel inclination can be changed is

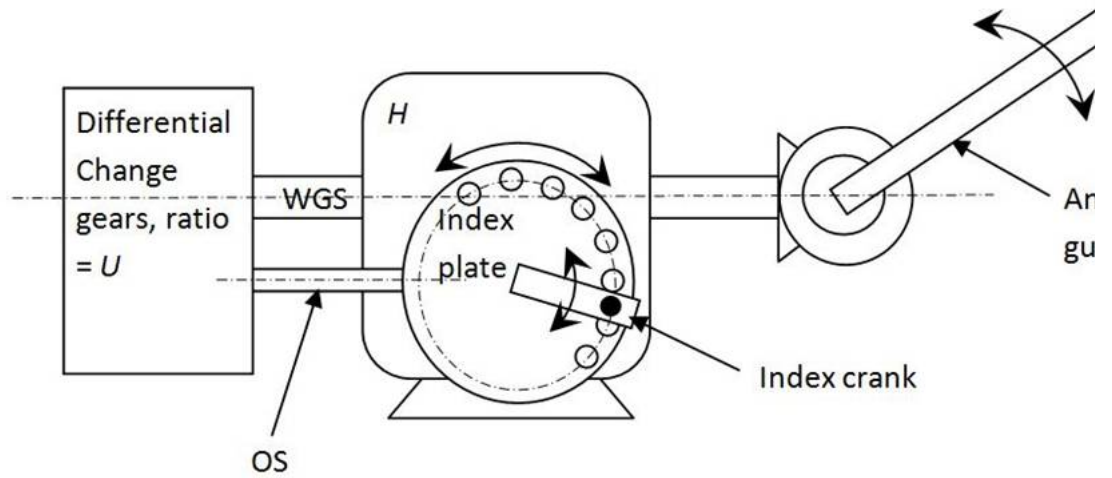


Fig. 2

- Option (a) : (1/83) of 1 rotation
- Option (b) : (1/79) of 1 rotation
- Option (c) : (1/87) of 1 rotation
- Option (d) : (40/83) of 1 rotation
- Option (e) : None of the others

No, the answer is incorrect.

Score: 0

Accepted Answers:

Option (e) : None of the others

9) An accurately machined straight tooth spur gear (Fig. 3) with 34 teeth and 4 module is measured by a gear tooth vernier caliper. The horizontal scale of the caliper is set with an opening of 6.081 mm and put against the tooth

of the gear, as shown in figure. A reading of Y mm is registered in the vertical scale in this setting. The value of Y is

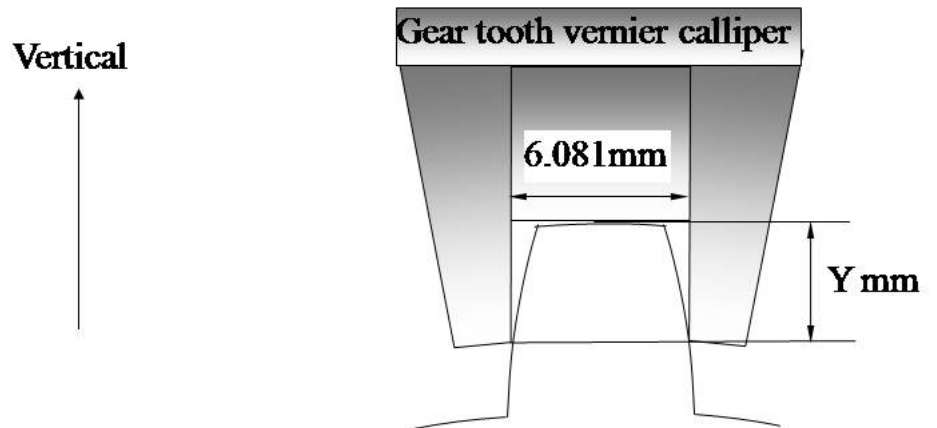


Fig. 3

- Option (a) : Greater than 4.073 mm
- Option (b) : Exactly equal to 4.073 mm
- Option (c) : Less than 4.073 mm

No, the answer is incorrect.

Score: 0

Accepted Answers:

Option (c) : Less than 4.073 mm

10) **One of the distinctive features of gear milling practice with rotary disc type form gear milling cutter is** 1 point

- Option (a) : Indexing process is continuous and takes place while cutting is going on
- Option (b) : A single cutter can cut the teeth on all gears for a particular module
- Option (c) : A certain amount of geometrical error is inherent on most of the gears cut by this process
- Option (d) : None of the others

No, the answer is incorrect.

Score: 0

Accepted Answers:

Option (c) : A certain amount of geometrical error is inherent on most of the gears cut by this process

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