External assessment

Multiple choice question book

Engineering

General instruction

- Work in this book will not be marked.

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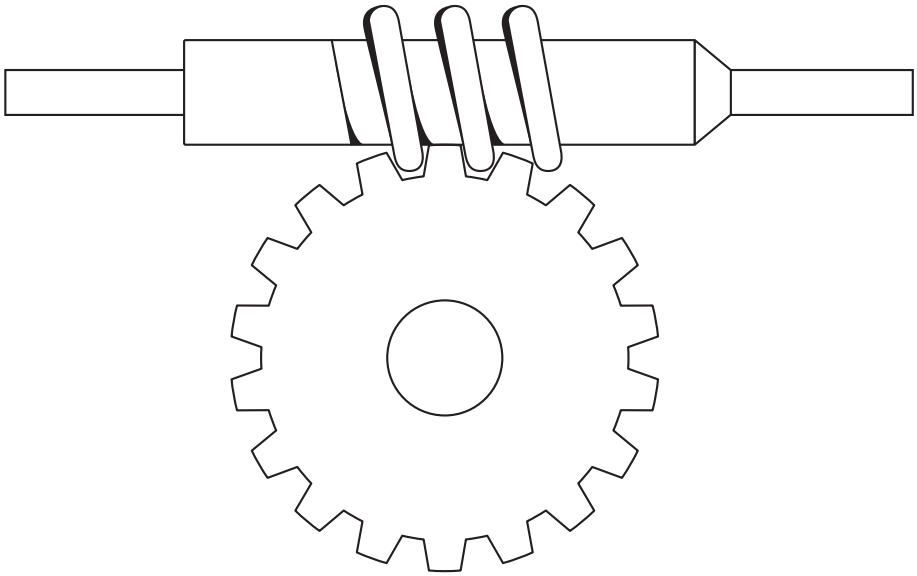
Section 1

QUESTION 1



What is the gear ratio of this worm and wheel?

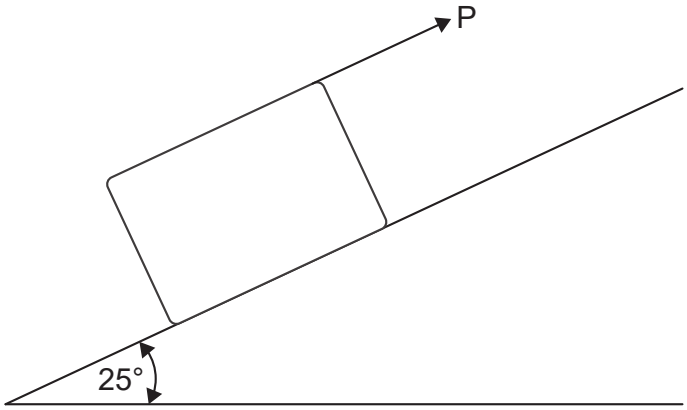
(A) 1:6

(B) 6:3

(C) 18:1

(D) 18:3

QUESTION 2



A 25 kg block is pulled up an incline using a force P as shown. What is the minimum value of P required to just move the box from rest if the coefficient of static friction is 0.4?

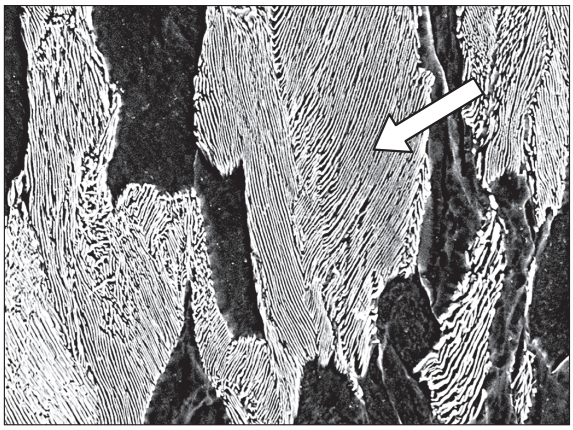
(A) 192.3 N

(B) 103.5 N

(C) 41.4 N

(D) 14.7 N

QUESTION 3



What is the hypo-eutectoid formation indicated by the arrow in this carbon steel microstructure?

(A) ferrite

(B) pearlite

(C) austenite

(D) cementite

QUESTION 4

High-voltage transmission cable insulation would most likely be manufactured from

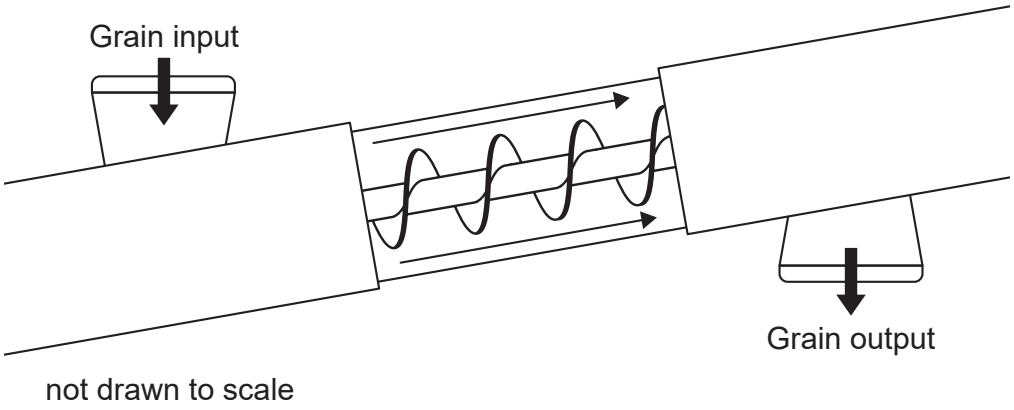
(A) polyvinyl chloride.

(B) polypropylene.

(C) polyethylene.

(D) polystyrene.

QUESTION 5



Screw conveyor specifications			
Screw pitch	**Screw length**	**Capacity moved per individual screw**	**Conveyor rpm**
150 mm	2400 mm	0.15 m^3	10

A screw conveyor is used to transport grain from an input chute up a 10° slope to a holding bin using the specifications shown. What is the volume of grain moved each minute?

(A) 225 m^3

(B) 24 m^3

(C) 2.4 m^3

(D) 1.5 m^3

QUESTION 6

An irrigation system uses a 7450 W electric motor to drive a pump that delivers 10 000 L of water per hour over a distance of 100 m. How efficient is the irrigation system? Assume that the system is without friction and that 1 L of water has a mass of 1 kg.

(A) 45%

(B) 37%

(C) 27%

(D) 10%

QUESTION 7

A 20 kg box sits just on the point of sliding on an incline plane. If the coefficient of static friction is 0.27, what is the angle of repose?

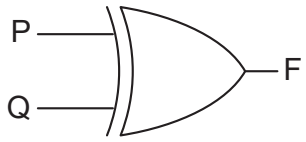
(A) 5°

(B) 13°

(C) 15°

(D) 16°

QUESTION 8



The truth table that corresponds to this logic gate is

(A)

P	Q	F
0	0	0
0	1	1
1	0	1
1	1	0

(B)

P	Q	F
0	0	0
0	1	0
1	0	0
1	1	1

(C)

P	Q	F
0	0	1
0	1	1
1	0	1
1	1	0

(D)

P	Q	F
0	0	1
0	1	0
1	0	0
1	1	0

QUESTION 9

A bicycle has gearing with a VR of 1:3. The rear tyre has an outside diameter of 740 mm. What is the distance travelled for every three rotations of the foot pedals?

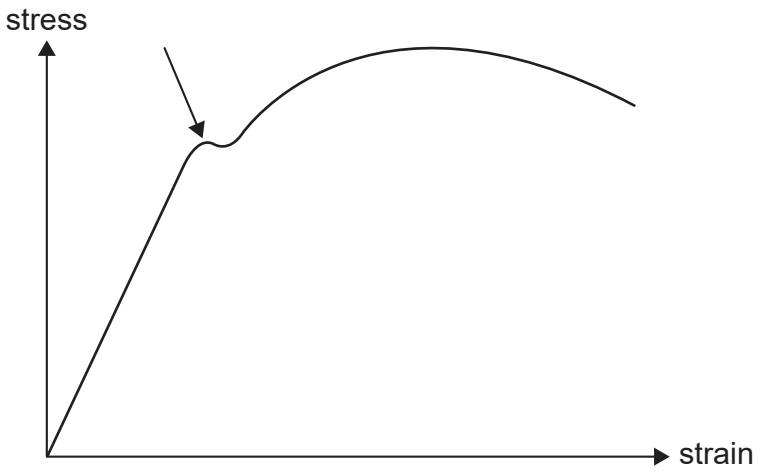
(A) 42 m

(B) 21 m

(C) 7 m

(D) 2 m

QUESTION 10



The key feature indicated by the arrow in this mild steel stress–strain diagram is

(A) ultimate tensile stress.

(B) Young's modulus.

(C) plastic limit.

(D) yield stress.

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References

Question 10

Adapted from Breakdown 2008, Typical stress vs. strain diagram for a ductile material (e.g. steel), Wikimedia Commons, https://commons.wikimedia.org/wiki/File:Stress_Strain_Ductile_Material.png Available under the Creative Commons Attribution-Share Alike 3.0 Unported license.