

### Draw and explain the turning moment diagram of 4-stroke I.C. Engine.

A turning moment diagram for a four stroke cycle internal combustion engine is shown. We know that in a four stroke cycle internal combustion engine, there is one working stroke after the crank has turned through two revolutions, i.e.  $720^\circ$  (or  $4\pi$  radians). Turning moment diagram for a four stroke cycle internal combustion engine. Since the pressure inside the engine cylinder is less than the atmospheric pressure during the suction stroke, therefore a negative loop is formed as shown in Fig. During the compression

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### Write the classification of follower (i) As per shape (ii) As per motion. Draw sketch of any one follower.

Classification of follower:

i) As per shape:

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Knife-edge follower: When the contacting end of the follower has a sharp knife edge, it is called a knife edge follower.

- Roller follower: When the contacting end of the follower is a roller, it is called a roller follower.
  - Flat faced or mushroom follower: When the contacting end of the follower is a perfectly flat face, it is called a flat faced follower and when the flat faced follower is circular, it is then called a mushroom follower.
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Write any two functions and applications of clutch.

Functions of clutch:

- i) A clutch is a device used to transmit rotary motion of one shaft to the other shaft when desired.
  - ii) A clutch is a device used for engaging and disengaging the engine crank shaft instantaneously when desired by the driver.
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Differentiate between mechanism and machine.

Difference between Mechanism & machine

Mechanism

Primary function is used to transmit or modify the motion.

It is not used to transmit the force.

A mechanism is a single system to transfer the motion

eg.i) In watch, energy stored on winding the spring is used to move hands.  
ii) An indicator is used to draw P-V diagram of engine

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Explain the working of Scotch Yoke mechanism with neat sketch.

Scotch yoke mechanism. This mechanism is used for converting rotary motion into a reciprocating motion. The inversion is obtained by fixing either the link 1 or link 3. In Fig. link 1 is fixed. In this mechanism, when the link 2 (which corresponds to crank) rotates about B as centre, the link 4 (which corresponds to a frame) reciprocates. The fixed link 1 guides the frame

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An I.C. Engine developing 10 kW of power is to be transmitted to a machine by flat leather belt. A 0.8 m diameter pulley is fitted on engine shaft and rotates at 300 rpm. The angle of lap is  $175^\circ$  and coefficient of friction in belt and pulley is 0.25. De

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### Explain with neat sketch method of drawing displacement diagram for SHM of follower.

The displacement diagram is drawn as follows for SHM of follower :

1. Draw a semi-circle on the follower stroke as diameter.
  2. Divide the semi-circle into any number of even equal parts (say eight).
  3. Divide the angular displacements of the cam during out stroke and return stroke into the same number of equal parts.
  4. The displacement diagram is obtained by projecting the points as shown in Figure
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### Compare Belt Drive and Chain Drive (four points)

PARTICULARS

BELT DRIVE

CHAIN DRIVE

Slip

Slip may occur

No slip (Positive drive)

Use

For low Velocity Ratio

For moderate Velocity Ratio

Suitability

For large centre distance

For moderate centre distance

Space requires

Large

Moderate

Lubrication

Not required

Require

Installation

cost Less

Moderate

Example

Floor Mill, Compressor,Conveyors

Bicycle, Automobile

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Draw a neat sketch of crank and slotted lever quick return mechanism of shaper. Write formula of cutting ratio.

Crank and slotted Quick Return Mechanism for shaper

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Formula of cutting ratio

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## State the necessity of Balancing. List different types of Balancing methods.

Necessity of Balancing:

[1] The high speed of engines and other machines is a common phenomenon now-a-

days. It is, therefore, very essential that all the rotating and reciprocating parts should

be completely balanced as far as possible.

[2] If these parts are not properly balanced, the dynamic forces are set up. These

forces not only increase the loads on bearings and stresses in the various members,

but also produce unpleasant and even dangerous vibrations.

[3] The balancing of unbalanced forces is caused by rotating masses, in order to

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