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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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Draw basic 'cam-follower' diagram showing its terminology (Mini four terminology).

Basic Cam Follower Profile:

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Explain the construction of 'Disc brake' with neat sketch.

Modern vehicles always equipped with disc brakes on at least the front two wheels. It

consists of mainly 3 parts,

[1] Rotor

[2] Caliper

[3] Brake pads

In between each piston and disc, friction pad held in position by springs. Higher

applied forces can be used in disc brakes than in drum brakes,

because the design of

the rotor is stronger than the design of the drum. Due to this, large resistance is

carried by flat disc. In this, Flat plate disc with flat friction pad are used against heavy

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Name the suitable mechanism to be used for following

applications: (i) Lifting water from well (ii) Connecting misaligned shafts (iii) Converting rotary motion into reciprocating motion (iv) Maintain constant relative motion between two rotary element

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APPLICATION

SUITABLE Mechanisim

i)

Lifting water from well

Pendulum pump (Bull Engine)

ii)

Connecting misaligned shaft

Oldham's coupling

iii)

Converting rotary motion into
reciprocating motion

Beam Engine (Crank & Lever Msm)

iv)

Maintain constant relative motion
between two rotary elements

Coupling rod of locomotive

Draw a neat sketch of 'Locomotive coupler' mechanism?

Explain its working in brief.

Figure: Coupler Rod of Locomotive

(Link AD = Link BC = Crank Link CD = Coupling Rod Link AB = Fixed Link = Frame)

Working of Coupler Rod of Locomotive:

It is an example of Double Crank Mechanism in which, Links AD and BC (having equal length) act as cranks and are connected to the respective wheels. Link CD acts as a coupling rod and link AB is fixed in order to maintain a Constant center to center distance between them. This mechanism is meant for transmitting rotary motion from one wheel to the other wheel.

Differentiate between belt drive and gear drive.

Difference between Belt and Gear Drive: (Any 04 Points, 01 Mark for each)

Basis

Belt Drive

Gear Drive
Power
transmitting Less
High
capacity
Slip & Creep
Material used
Type of drive
Centre distance between
the shafts
Overload taking capacity
Velocity Ratio
Use
Occurs
Flexible in nature
Slip drive
Medium or large
No
Rigid material used
Positive drive
Very less
Slips when overloaded
Damages
when
overloaded

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Draw the following displacement diagram for follower: (i) S.H.M (ii) Uniform acceleration and deceleration

Displacement Diagram for Simple Harmonic Motion (SHM):

Displacement Diagram for Uniform Acceleration and Deceleration:

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Explain the term: (i) Slip (ii) Creep

Slip: The forward motion of the driver without carrying the belt with it or forward

motion of the belt without carrying the driven pulley with it, is called slip of the belt.

Slip reduces velocity ratio and also power transmission capacity of the belt drive. Less

slip in the belt drive is desirable.

OR

When belt is transmitted power from driver to driven pulley, there is a loss of motion

due to insufficient frictional grip and therefore the speed of driven pulley is less than

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Draw neat diagram of 'scotch yoke mechanism'? Explain its constructional features in brief.

Constructional Features of Scotch Yoke Mechanism:

[1] In this mechanism, two sliding pairs and two turning pairs are used. So it is an

inversion of Double Slider Crank Chain Mechanism.

[2] It consists of following types of links with relative motion as mentioned below;

Link 1 (B) - Fixed Link - Guide the Frame

Link 2 - Crank - Turning Motion - Rotates about Point B in Link 1

Link 3 - Slider -Sliding Motion

Link 4 - Fixed Link - Frame - Reciprocating Motion

[3] The inversion is obtained by fixing either the Link 1 or Link

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Define coefficient of fluctuation of energy.

It may be defined as the ratio of the maximum fluctuation of energy to the work done per cycle.

Mathematically it is expressed as;

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