Printed Pages : 4

(Following Paper ID and Roll No. to be filled in your Answer Book)
PAPER ID : 101504
Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B. Tech.

(SEM. V) (ODD SEM.) THEORY EXAMINATION, 2014-15
THEORY OF MACHINE

Time : **3** Hours]   [Total Marks : **100**

Note: Attempt all questions. Be precise in your answer. Draw neat and clean diagram where ever required Assume data suitably if necessary.

SECTION - A

Attempt All Questions   **2x10=20**

(a)   Sketch & explain any two inversions of a double slider crank chain.

(b)   Define a kinematic link of element. "Kinematic link may be machine component but machine component may not be a kinematic link." Explain the statement.

(c)   Define kinematic pair with example.

(d)   Describe acceleration of a point on a link, briefly with steps

(e)   Define gears with their types.

(f)   Define gyroscopic couple and why is it used in machinery.

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(g) Describe the classification of Followers and Cams in brief.

(h) Explain balancing reciprocating of engines with their application.

(i) Define lower pair and higher pair with example.

(j) What is meant by applied and constrained forces? Explain with application

SECTION B

Attempt Any Three Questions   10x3=30

(a) Explain and drive an expression for Davis Steering mechanism and advantage & disadvantage of Davis steering.

(b) What do you mean by equivalent offset inertia force? Explain with help of diagram turning moment diagram with help of an example.

(c) What do you mean by gyroscope couple? Derive a relation for its magnitude.

(d) Derive a relation of Displacement, Velocity and Acceleration Diagram when the follower moves with Acceleration and Retardation.

(e) Derive an equation tor the D.O.F. of a mechanism & find D.O.F of following mechanisms
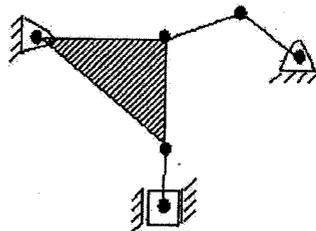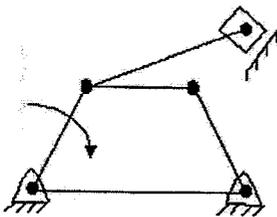
SECTION C

Attempt All Questions   10x5=50

    (a)   A cam rotating clockwise at a uniform speed of 100 rpm is required to give motion to a knofe edged follower as below:

        (i)   Follower to move outwards through a distance of 25 mm during 120° of cam rotation

        (ii)   Follower to dwell for the next 60° of cam rotation,

        (iii)   Follower to return to its starting position during next 90° of cam rotation

        (iv)   Follower to dwell for the rest of the cam rotation

    The minimum radius of the cam is 50 mm and the line of stroke of the follower passes through the axis the camshaft. If the displacement of the follower takes place with uniform and equal acceleration and retardation on both the outward and return stroke, find the maximum velocity and acceleration during outstroke and return stroke

OR

    Two gears of module 4 mm have 24 and 33 teeth. The pressure angle is 20° and each gear has a standard addendum of one module. Find the length of arc of contact and the maximum velocity of sliding if pinion rotates at 120 rpm

    (b)   Derive a relation minimum number to teeth on the pinion in order to avoid interference.

OR

    Explain the application and neat sketch if interference in involutes gears and cycloid gear.

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(c) Deduce expression for Variation of tractive force and Swaying Couple.

OR

Explain a relation of balancing of a single rotating mass by two masses rotating in different planes with derivation

(d) How do we do the static force analysis of four bar chain using free body diagram?

OR

Derive the formula of velocity and acceleration for the piston of a reciprocating engine.

(e) What do you mean by Spin, Precession and gyroscopic planes?

OR

A single cylinder reciprocating engine has a speed 240 rpm, stroke 300mm, mass of reciprocating parts 50 kg, mass of revolving parts at 150mm radius 37 kg. If two third of the reciprocating parts and all the revolving parts are to be balanced, find: A. The balance mass required at a radius of 400 mm and B. The residual unbalanced force when the crank has rotated 60° from inner dead centre.

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