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Question Paper Code : 57547

B.E/B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016.

Fourth Semester

Mechanical Engineering

ME6401-KINEMATICS OF MACHINERY

(Common to Mechanical, Automobile Engineering and Automation Engineering)

(Regulation 2013)

Time: Three hours

Maximum: 100 marks

Answer ALL questions.

PART – A (10 x 2= 20 marks)

1. Classify kinematic pairs based on nature of contact. Give examples.
2. When a linkage becomes mechanism?
3. What is a relative pole, with respect to velocity analysis?
4. What are the different methods used for finding the velocity?
5. Define trace point of a cam.
6. Define tangent cam.
7. Define normal and axial pitch in helical gears.
8. What is the advantage when arc of recess is equal to arc of approach in meshing gears?
9. What are self energizing brakes?
10. Why self locking screws have lesser efficiency?

PART – B (5 × 16 = 80 Marks)

- 11 a (i) Classify kinematic pairs based on degrees of freedom.
(ii) What is inversion and list its properties.
OR
b (i) Find the degrees of freedom of the mechanisms shown in fig.11(b).
(ii) State the inconsistencies of Grubler's criterion.
- 12 a The diagram shows part of a quick return mechanism. The pin A slides in the slot when the disc is rotated. calculate the angular velocity and acceleration of link BC when

OR

- b Derive the expression for coriolis component of acceleration with neat sketch and give its direction for various conditions.
- 13 a (i) Draw the displacement, velocity and acceleration curves, when the follower moves with simple harmonic motion and derive the expression for maximum velocity and maximum acceleration.
(ii) Depict the types of cames.

OR

- b Follower type=roller follower, lift=25mm; base circle radius=20mm; roller radius=5mm; out stroke with UARM for 120 degree cam rotation; dwell for 60 degree cam rotation return stroke with URAM for 90 degree cam rotation; dwell for the remaining period. Determine max. velocity and acceleration during out stroke and return stroke if the cam rotates at 1200 rpm in counter clockwise direction. draw the cam profile for conditions with follower offset to right of cam center by 5mm.
- 14 a The cutter of a broaching machine is pulled by square threaded screw of 55mm external diameter and 10mm pitch. the operating nut takes the axial load of 400 N on flat surface of 60mm internal diameter and 90mm external diameter .If the coefficient of friction is 0.15 for all contact surfaces on the nut, determine the power required to rotate the operating nut, when the cutting speed is 6m/min.

OR

- b Following data is given for a rope pulley transmitting 23.628KW. Dia of pulley = 40 cm; speed = 110 rpm; angle of groove = 45 degree; angle of lap = 60 degree, coefficient of friction = 0.28, No. of ropes=10. mass in kg/m length of ropes = 0.0053 and working tension is limited 12.2 where c =girth of rope in cm. Find (i)initial tension and (ii) diameter of each rope.
- 15 a Explain gear nomenclature with neat diagram and define all salient terms pertaining to the gear.

OR

- b Fig shows a differential gear used in a motor car. The pinion A on the propeller shaft has 12 teeth and gears with the crown gear B which has 60teeth.The shafts P and Q from the axles to which the road wheels are attached. If the propeller shafts rotates at 1000rpm.and the road wheel attached to axle Q has a speed of 210rpm. while taking a turn, find the speed of road wheel attached to axle P.