B.Tech Sem – V (2007 Course) (Mechanical Engg.) : SUMMER - 2019

SUBJECT:THEORY OF MACHINE-II

Day: Thursday
Date: 09/05/2019

Time: 10.00 AM TO 01.00 PM
Max. Marks: 80

S-2019-3082

N.B.:

1) **Q.No.1** and **Q.No.5** are **COMPULSORY.** Out of remaining attempt **ANY TWO** questions from each section
2) Figures to the right indicate FULL marks.
3) Answer to the both section should be written in SAME answer book.
4) Assume sutaible data, if necessary.

SECTION-I

Q.1 **a)** Explain the limiting angle of friction and angle of repose. **(05)**

b) Explain with neat sketch prony Brake Dynamometer. **(05)**

c) Differentiate between involute and cycloidal gears. **(04)**

Q.2 **a)** A shaft rotating at 200 rpm drives another shaft at 300 rpm and transmits 6 kw through a belt. The belt is 100 mm wide and 10 mm thick. The distance between the shaft is 4 m. The smaller pully is 0.5 m in diameter. Calculate the stress in the belt if it is i) an open belt drive, ii) a cross belt drive. Take $\mu = 0.3$. **(07)**

b) Derive the maximum effeciency of screw jack. **(06)**

Q.3 **a)** Describe with neat sketch a centrifugal clutch and deduce an equation for the total torque tranmitted. **(07)**

b) In a laboratory experiment, the following were recorded with rope brake: Diameter of flywheel 1.25 m, diameter of rope 12 mm, dead load on the brake 800 N, spring load 200 N and engine speed 240 rpm. Determine the brake power of the engine. **(06)**

Q.4 A pair of 20^0 full depth involute spur gears having 30 and 50 teeth respectively of module 4 mm are in mesh. The smaller gear rotates at 1000 rpm. Determine i) sliding velocities at engagement and at disengagement of pair of a teeth and ii) Contact ratio. **(13)**

SECTION-II

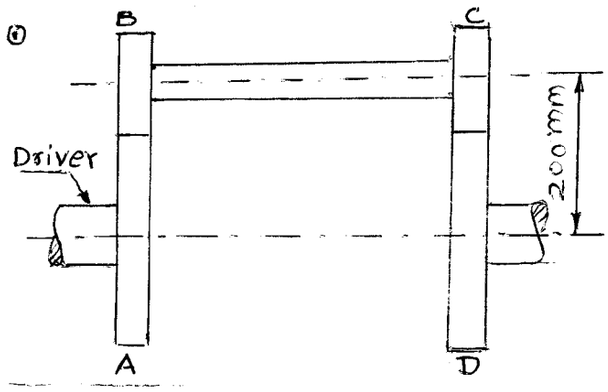
Q.5 **a)** Explain the terminology of Bevel gear. **(05)**

b) Explain with neat sketch different types of followers. **(05)**

c) Explain the term 'function of speed' as applied to flywheel. **(04)**

P.T.O.

Q.6 The speed ratio of the reverted gear train shown in figure is to be 12. The module pitch of gear A and B is 3.125 mm and of gears C and D is 2.5 mm. Calculate the suitable number of teeth for the gears. No gear is to have less than 24 teeth. **(13)**



Q.7 Draw the profile of a cam in which the follower moves with S.H.M. during ascent while it moves with uniformly accelerated motion during descent. **(13)**
Lift of follower = 4 cm, least radius of cam = 5 cm, Angle of ascent = 48^0 , Angle of descent = 60^0, Angle of dwell between ascent and descent = 42^0, The diameter of roller = 3 cm.
Distance between line of action of the follower and the axes of cam = 2 cm. If the cam rotates at 360 rpm anticlockwise, find the maximum velocity and acceleration of the follower during descent.

Q.8 An engine develop 200 kw at a mean speed of 100 rpm. The coefficient of fluctuation of speed is $\pm 2\%$ of mean speed and the coefficient of fluctuation of energy is 0.10. Knowing the mean diameter of flywheel rim as 2.0 meters, density of flywheel material as 7200 kg/m^3 and the hub and spokes provide 5% of the rotational inertia of the flywheel, find the mass and cross-sectional area of the flywheel rim. **(13)**

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