

B.TECH SEM – V (2007 COURSE) (MECHANICAL ENGG.) :
WINTER - 2017
SUBJECT: THEORY OF MACHINE – II

Day : **Thursday**
Date : **11/01/2018**

Time : **02.30 PM TO 05.30 PM**
Max. Marks: 80

W-2017-2474

N.B.

- 1) Q.1 and Q.5 are **COMPULSORY**. Out of the remaining attempt any **TWO** questions from each Section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE** answer book.
- 4) Draw neat and labeled diagrams **WHEREVER** necessary.
- 5) Use of non-programmable calculator is allowed.
- 6) Assume suitable data if necessary.

SECTION – I

- Q.1**
- a) Discuss relative merits and demerits of belt, rope and chain drive for transmission of power. **(05)**
 - b) What is difference between absorption and transmission dynamometers? What is torsion dynamometer? **(05)**
 - c) Give a comparison between involute and cycloidal gears. **(04)**
- Q.2**
- a) An effort of 1500 N is required to just move a certain body up an inclined plane of angle 12° , force acting parallel to the plane. If the angle of inclination is increased to 15° then the effort required is 1720 N. Find the weight of the body and the coefficient of friction. **(07)**
 - b) Derive the condition for transmitting the maximum power in a flat belt drive. **(06)**
- Q.3**
- a) Derive equation for breaking torque required in differential band brake while rotating clockwise and anticlockwise. **(06)**
 - b) A single plate clutch with both sides of plate being effective, is used to transmit power at 1400 rpm. It has outer and inner radii 80 mm and 60 mm respectively. The maximum intensity of pressure is limited to $10 \times 10^4 \text{ N/m}^2$. If $\mu = 0.3$ determine i) total pressure exerted on the plate ii) power transmitted. **(07)**
- Q.4**
- A pair of 20° full depth involute spur gear having 30 and 50 teeth respectively of module 4 mm are in mesh. The smaller gear rotates at 1000 rpm. Find **(13)**
- i) the sliding velocity at engagement and at disengagement of a pair of teeth.
 - ii) Contact ratio.

P.T.O

SECTION – II

- Q.5** a) Define **i)** Normal pitch and **ii)** axial pitch relating to helical gears. (04)
- b) What is function of flywheel? How does it differ from that of a governor? (05)
- c) Draw the displacement, velocity, acceleration diagrams for a follower when it moves with cycloidal motion. (05)
- Q.6** In an epicyclic gear train, an arm carries two gears 'A' and 'B' having 36 and 45 teeth respectively. If the arm rotates at 150 rpm in the anticlockwise direction about the centre of the gear 'A' which is fixed, determine the speed of gear 'B'. If the gear 'A' instead of being fixed, makes 300 rpm in the clockwise direction what will be the speed of gear 'B'? (13)
- Q.7** Draw the profile of the cam for following specifications. Cam shaft diameter = 40 mm, least radius of cam = 25 mm. Diameter of roller = 25 mm, angle of lift = 120° , angle of fall = 150° , lift of the follower = 40 mm, number of pauses are two of equal interval between motions. During the lift the motion is S.H.M. During the fall the motion is uniform acceleration. The speed of cam is uniform. The line of stroke of the follower is offset by 12.5 mm towards left of the centre of the cam. (13)
- Q.8** a) Explain the term 'fluctuation of energy' and 'fluctuation of speed' as applied to flywheels. (06)
- b) A vertical double acting steam engine develops 75 KW at 250 rpm. The maximum fluctuation of energy is 30% of the work done per stroke. The maximum and minimum speeds are not vary more than 1% on either side of the mean speed. Find the mass of the flywheel required, if the radius of gyration is 0.6 m. (07)

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