

(Following Paper ID and Roll No. to be filled in your
Answer Books)

Paper ID : 180419

Roll No.

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B.TECH.

Theory Examination (Semester-IV) 2015-16

THEORY OF MACHINES

Time : 3 Hours

Max. Marks : 100

Section-A

1. Attempt each short answer type question :

(2×10 = 20)

- (a) Define the 'Element' & 'Link' of a common machine.
- (b) What do you understand by degree of freedom?
- (c) For what purposes a cam is used?
- (d) What is reverted gear train?
- (e) By which materials a belt is made up of?
- (f) For what purposes chain drives are used?
- (g) Mention the types of governors.
- (h) What is Governor hunting?

- (i) Enumerate the main functions of a flywheel.
- (j) What do you understand by static balancing?

Section-B

2. Attempt any five parts of the following: (10×5 = 50)

- (a) Classify the kinematic pairs. Also differentiate between machine & Structure.
- (b) Derive the expression for displacement, velocity and acceleration for a circular arc cam operating a flat faced follower, when the contact is on the circular flank.
- (c) The power is transmitted from a pulley 1m diameter running at 200 rpm to a pulley 2.25 m diameter by means of a belt. Find the speed lost by the driven pulley as a result of creep, if the stress on the tight side and slack side of the belt is 1.4 MPa and 0.5 MPa respectively. The young's modulus of the material of belt is 100 MPa.
- (d) Explain the sensitiveness and stability of governors. How governor differs that of flywheel?
- (e) Four masses m_1 , m_2 , m_3 and m_4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radii of rotation are 0.2m, 0.15m, 0.25m and 0.3m respectively

(2)

and the angles between successive masses are 45° , 75° , and 135° . Find the position and magnitude of the balance masses required, if its radius of rotation is 0.2m.

- (f) Write short note on the following :
- (i) Four bar chain
 - (ii) Slider crank chain
- (g) Define gear train. What are the properties of simple gear train? Show that the intermediate gears have no effect on the speed ratio.
- (h) A pinion having 18 teeth engages with an internal gear having 72 teeth. If the gear has involute profiled teeth with 20° pressure angle, module of 4 mm and the addenda on pinion and gear are 8.5 mm and 3.5 mm respectively, find the length of path of contact?

Section-C

Attempt any two parts of the following: (15×2 = 30)

3. (i) A single cylinder reciprocating engine has speed 240 rpm, stroke 300 mm, mass of reciprocating parts 50 kg, mass of revolving parts at 150 mm radius 37 kg. If two third of the reciprocating parts and all the revolving parts are

to be balanced, find the balance mass required at a radius of 400 mm.

- (ii) Explain the balancing of several masses rotating in the same plane.
4. (i) Briefly explain and classify different types of followers.
- (ii) Derive relations for velocity and acceleration for a convex cam with a flat faced follower.
5. What is the principles of frictional clutch? What are their types? Explain the working of a single plate clutch with the help of diagram.

