Total No. of Printed Pages:3

SUBJECT CODE NO:- P-3
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(MECH/PROD) Examination MAY/JUNE-2016
Theory of Machines II
(Revised)

[Time: Three Hours] **[Max Marks:80]**

"Please check whether you have got the right question paper."

N.B i) Solve any three questions from each section.
ii) Assume suitable data, if required.

Section A

Q.1 a) State and prove the law of gearing. 04

b) Two involute gears in mesh have a module of 8mm and a pressure angle of 20^0. The larger gear has 57, while the minion has 23 teeth. If the addenda on minion and gear wheels are equal to one module find the 09

i. Contact ratio
ii. Angle of action of the pinion and the gear
iii. Ratio of the sliding to rolling velocity at the a) Beginning of contact b) Pitch point c) End of contact.

Q.2 a) What do you understand by 'gear train'? Discuss the various types of gear trains. 06

b) The center distance between two meshing spiral gears is 150mm and the angle between the shafts is 60^0. The gear ratio is 2 and the normal circular pitch is 10mm. The driven gear has ha helix angle of 25^0 determine the 07

a) Number of teeth on each wheel
b) Exact centre distance
c) Efficiency, if the friction angle is 4^0.

Q.3 a) Define and explain the following terms 06

1) Stability
2) Sensitiveness
3) Hunting

b) In a spring loaded Hartnell type governor, the extreme radii of rotation of the balls are 80mm and 120mm. The ball arm and the sleeve arm of the bell crank lever are equal in length. The mass of each ball is 2kg. If the speeds at the two extreme position are 400 and 420 rpm. Find 07

i. Initial compression of the central spring.
ii. Spring constant

Q.4 An otto cycle engine develops 50KW at 150rpm with 75 explosions per minute. The change of speed from commencement to the end of power stroke must not exceed 0.5% of mean on either side. Find the mean diameter of the flywheel and a suitable rim cross section having width four times the depth, so that the loop stress does not exceed 4 MPa. Assume that the flywheel stroke 16/15 times the energy stored by the rim and the work done during power stroke is 1.40 times the work done during the cycle. Density of the rim material is 7200kg/m^3. 13

Q.5 a) Obtain the expression for the length of a chain. 07

b) In a flat belt drive the initial tension is 2000N. The coefficient of friction between the belt and the pulley is 0.3 and the angle of lap on the smaller pulley is 150^0. The smaller pulley has a radius of 200mm and rotates at 500rpm. Find the power in KW transmitted by the belt. 07

Section B

Q.6 a) Explain the gyroscopic effect on ship during steering, pitching and rolling. 06

b) Each wheel of a motorcycle is of 600mm diameter and has a moment of inertia of 1.2Kgm^2. The total mass of the motorcycle and rider is 180Kg and the combined center of mass is 580mm above the ground level when the motorcycle is upright. The moment of inertia of the rotating parts of the engine is 0.2Kgm^2. The engine speed is 5 times the speed of the wheels and is in the same sense. Determine the angle of wheel necessary when the motorcycle takes a turn of 35m radius at a speed of 54 km/h. 07

Q.7 a) Explain the neat sketch the cone clutch. 05

b) A suitable clutch transmits 25KW at 900rpm. The maximum pressure intensity between the plates is 85KN/m^2. The outer diameter of the plate is 360mm. Both the sides of the plate are effective and the coefficient of friction is 0.25. Determine 08

i. Inner diameter of the plate.

ii. Axial force to engage the clutch.

Q.8 a) What are the different causes and effect of vibration? 04

b) Find the natural frequency of the half solid cylinder shown in fig 01 when slightly displaced from the equilibrium position and released. 09

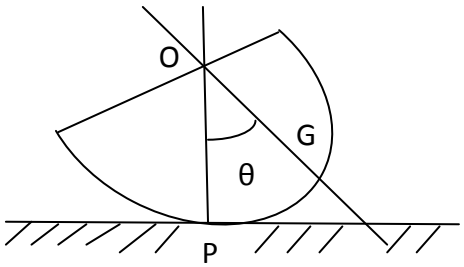

Fig No. 1

Q.9 a) Define and explain: 06

1) Damping factor
2) Damping coefficient
3) Logarithmic decrement

b) Determine the time in which the mass in damped vibrating system would settle down to 1/50th of its initial deflection for the following data M=200Kg $\tau_g = 0.22$ K=40N/mm. Also find the number of oscillations completed to reach this value of deflection. 07

Q.10	a)	Explain the force and motion transmissibility.	06
	b)	A machine part of mass 2Kg vibrates in a viscous medium. Determine the damping coefficient when a harmonic exciting force of 25N results in resonant amplitude of 12.5mm with a period of 0.25 second. If the system is excited by a harmonic force of frequency 4Hz. What will be the percentage increase in the amplitude of vibration when dumper is removed as compared with that with dumping?	08