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NAG404

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

PAPER ID : 180419

Roll No.

B. Tech.

(SEM. IV) THEORY EXAMINATION, 2014-15

THEORY OF MACHINERY

Time : **3** Hours] [Total Marks : **100**

Note : The question paper is divided in three sections. Attempt each section. Assume missing data suitably if necessary. The use of calculator is permitted.

SECTION - A

1 Attempt each short answer type question : **2×10=20**

(a) Define the 'Lower and higher pairs' of a common machine ?

(b) What do you understand by degree of freedom ?

(c) What is a spiral cam ?

(d) What is reverted gear train ?

(e) What is the velocity ratio of a belt ?

(f) For what purposes a chain drives are used ?

(g) What do you mean by governor regulation?

(h) What is Governor hunting?

(i) Enumerate the main functions of a flywheel?

(j) What do you understand by dynamic balancing?

SECTION - A

2 Attempt any three parts of the following : **10×3=30**

(a) Derive the expression for displacement, velocity and acceleration for a circular arc cam operating flat faced follower, when the contact is on the circular flank.

(b) Classify the kinematic pairs. Also differentiate between machine and Structure.

(c) Explain the sensitiveness and stability of governors. How governor differs that of flywheel?

(d) The power is transmitted from a pulley 1 m 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.

(e) Explain the balancing of several masses rotating in the same plane.

SECTION - C

3 Attempt any five parts of the following : **10×5=50**

(a) A single cylinder reciprocating engine has speed 240 rpm, stroke 300mm, 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?

OR

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 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.

(b) Briefly explain and classify different types of followers.

OR

Derive relations for velocity and acceleration for a convex cam with a flat faced following.

(c) A torque of 350 Nm is transmitted through a cone clutch having a mean diameter of 300 mm and a semi-cone angle of 15°. The maximum normal pressure at the mean radius is 150 kN/m^2. The coefficient of friction is 0.3. Calculate the width of contact surface. Also, find the axial force to engage the clutch.

OR

What is the principle of frictional clutch?. What are their types? Explain the working of a single plate clutch with the help of diagram?

(d) Define gear strain? What are the properties of simple gear train? Show that the intermediate gears have no effect on the speed ratio?

OR

A pinion having 18 teeth engages with an internal gear having 72 teeth. If the gear have involute profiled teeth with 200 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?

(e) Write short note on the following :

(i) Four bar chain

(ii) Slider crank chain.

OR

(i) Centrifugal governor

(ii) Principle of governor.