B.E. Power Engg., Second Year Second Semester Examination-2019

Subject: Theory of Machines & Machine Design

Full Marks: 100　　　　　　　　　　　　　　　　　　　　　　**Time: 3 Hours**

Different questions of same group are to be answered together

Group- I

Answer any **four (4)** from the followings.　　　　　　　　　　Marks: 4 x 8 = 32

1. How would you design a shaft?
2. Explain quick return ratio in shaping machine.
3. Explain 'Kutzbach Criterion' to plane mechanism and what is a 'structure'?
4. What do you mean by 'Higher pair and Lower pair' in mechanism and give example.
5. Derive the expression of natural frequency for free transverse vibration by equilibrium method.

Group- II

Answer any **one (1)** from the followings.

6. (i) Define fit and how many types of fit are there?

   (ii) Explain with example 'Unilateral tolerance and bilateral tolerance'.

   (iii) Differentiate between 'Selective assembly and Interchangeability'　　　Marks: 3 x 4 = 12

7. Draw the sketch of hole basis system and explain. Explain why it is preferred over shaft basis system.
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Group- III

Answer any **three (3)** from the followings.　　　　　　　　　Marks: 3 x 15 = 45

8. A crank and slotted lever mechanism used in a shaper has a centre distance of 350 mm between the centre of oscillation of the slotted lever and the centre of rotation of the crank. The radius of the crank is 140 mm. Find the ratio of the time of cutting to the time of return stroke.

9. A plate clutch consists of a pair of contacting surfaces. The inner and outer diameters of the friction disk are 100 mm and 200 mm respectively. The coefficient of friction is 0.2 and the permissible intensity of pressure is 1 N/mm^2. Assuming **uniform-wear criterion**, calculate the power transmitting capacity of the clutch at 750 rpm.

10. A pair of spur gear consists of a 20 teeth pinion meshing with a 120 teeth gear. The module is 4 mm. Calculate-i) The centre distance, ii) the pitch circle diameters of the pinion and the gear, iii) the addendum and dedendum iv) the tooth thickness v) the bottom clearance

11. A compressor is running at 720 rpm, which is driven by a 25 kW, 1440 rpm motor. The centre distance is 3 m. The belt is open type. Find i) Diameter of two pulleys, ii) wrap angle of two pulleys and iii) length of the belt.

Group- IV

Answer any **one (1)** from the followings.　　　　　　　　　Marks: 1 x 11 = 11

12. Derive the expression for length of an 'open belt drive'
13. Derive the expression for actuating force on the lever in case of Block brake with short shoe.