B.E. Power Engg., Second Year Second Semester Examination-2018

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. Describe briefly lower pair and higher pair mechanism.
2. Explain quick return mechanism in shaping machine.
3. What is 'Kutzbach Criterion' to plane mechanism and find the number of degree of freedom of the following plane mechanism? [Fig.1]
4. Derive the expression for applied force to lower the load by a screw jack.
5. Derive the expression of natural frequency for free longitudinal vibration by equilibrium method.

Group- II

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

6. (i) What is tolerance and fit?

(ii) Draw the conventional diagram of limits and fits and define the terms – (a) Basic size (b) fundamental deviation Marks: 6+6 = 12

7. Draw the sketch of hole basis system and explain. Explain why it is preferred over shaft basis system. Marks: 12

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 300 mm between the centre of oscillation of the slotted lever and the centre of rotation of the crank. The radius of the crank is 120 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-pressure criterion**, calculate the power transmitting capacity of the clutch at 750 rpm.
10. A pair of spur gear consists of a 25 teeth pinion meshing with a 120 teeth gear. The module is 5 mm. Calculate-i) The centre distance, ii) the pitch circle diameters of the pinion and the gear, iii)the addendum and dedendum.
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 'self-locking condition' in case of Block brake.

Fig.1