Code No: RT22352 **R13** SET - 1

II B. Tech II Semester Supplementary Examinations, April/May - 2019
THEORY OF MACHINES
(Agricultural Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Explain with examples, different types of kinematic pairs. (4M)
   b) What is a gear train? What are its main types? (4M)
   c) Why is balancing necessary for rotors of high speed engines? (4M)
   d) Illustrate with sketches, how do you locate instantaneous centre for different combinations of links? (4M)
   e) Define coefficient of fluctuation of energy. (3M)
   f) Explain the reasons for not using the Watt governor for high speeds. (3M)

PART –B

2. a) How kinematic pairs are classified based on the type of relative motion? Explain with sketches. (8M)
   b) Explain with help of suitable sketches the inversions of double slider crank chain mechanism. (8M)

3. a) State and prove law of gearing. What is meant by conjugate gears? How is it satisfied by involute profile gear teeth? (6M)
   b) Figure 1, shows an epicyclic gear in which arm A is fixed to the shaft S, B is free to rotate on S and F is separately driven. A receives 7.5kW at 200rpm and F is driven in the same direction at 100rpm. Determine the speed of B and the torque on its shaft. (10M)

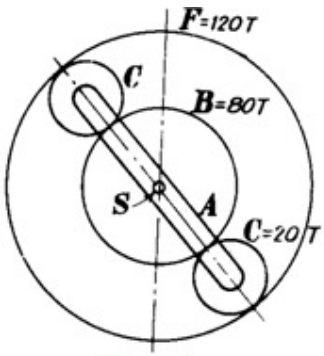

Figure 1
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4. a) Explain why flywheels are used in punching machines. (6M)
   b) An engine running at 150rpm drives a line shaft by means of a belt. The engine pulley is 750mm diameter and the pulley on the line shaft is 450mm. A 900mm diameter pulley on the line shaft drives a 150mm diameter pulley keyed to a dynamo shaft. Find the speed of the dynamo shaft when there is no slip. (10M)

5. a) Establish a formula for the frictional torque transmitted by a cone clutch. (8M)
   b) Calculate power lost in overcoming friction and number of collars required for the thrust bearings whose contact surfaces are 20 cm external radius and 15 cm internal radius. The coefficient of friction is 0.08. The total axial load is 30 kN. Intensity of pressure is not to exceed 0.35 Mpa. Speed of the shaft is 420 rpm. (8M)

6. a) Explain by means of controlling force curves the following:
   i) Stable governor ii) unstable governor (6M)
   b) Each arm of a porter governor is 250mm long and is pivoted on the axis of rotation. The mass of each ball is 5kg and of the sleeve 25kg. The sleeve begins to rise when the radius of rotation of the balls is 150mm and reaches at the top when it is 200mm. Determine the range of speed, lift of the sleeve, governor effort and power. In what way these values are changed if friction at the sleeve is equivalent to 10N. (10M)

7. A small three throw crank shaft has cranks of radii 125 mm, set at 120^0, to each other and equally spaced with a pitch of 250 mm. The revolving masses at crank radii are the same for each line and of amount 15 kg. The shaft is supported in two bearings symmetrically arranged with respect to the cranks and 850 mm apart. Determine the dynamical loads on the bearings for a speed of 500 rpm. The shaft is to be balanced by means of a mass at radius of 187.5mm in the plane of No 1 crank and a mass at radius 250 mm attached to the flywheel situated 225 mm, beyond the bearing adjacent to No 3 crank. Determine the magnitudes of these balance masses and their positions relative to No 1 crank. (16M)