Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institute of Manipal University, Manipal

VII SEMESTER B.TECH (MECHANICAL/IP ENGG.) END SEMESTER MAKE-UP EXAMINATIONS, DEC 2017

SUBJECT: DESIGN OF MECHANICAL SYSTEMS [PE-VI] [MME 4002]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL the** questions.
- Additional data required may be appropriately assumed.
- Assumptions made must be clearly mentioned.
- Use of Design Data Hand Book is allowed.

1. Determine the power required to run a batch type concrete mixer having mixing capacity for 1 bag of cement. **(08)**

2. For a four stroke petrol engine indicated power is 24 kW at 2000 rpm. The stroke length is 140 mm. The mean effective pressure is 1.2 MPa. The maximum explosion pressure is 2.5 MPa. The weight of the reciprocating parts is 20 N. The length of the connecting rod is 300 mm. Determine the thickness of the end cap of connecting rod, if the permissible tensile strength of end cap material is 100 MPa. **(08)**

3. Design the left side flange of protected flange coupling transmitting 75 kW at 500 rpm. Permissible tensile strength for steel and cast iron may be taken as 120 MPa and 100 MPa respectively. Consider an overload of 25 % and neglect the design of key. **(09)**

4. Design an automobile single plate clutch to transmit 35 kW at 2500 rpm. There are 3 toggle levers, actuating arm & clutch pedal for releasing the clutch. Cross section of lever is rectangular with width = 0.25 depth. There are 6 springs to engage the clutch. Allowable shear stress for spring material is 360 MPa. Mechanical advantage required is 20. Maximum foot pressure on the pedal is 350 N. Draw the **sectional front view** of clutch assembly. **(25)**

OR

Design a centre crankshaft for an IC Engine with the following details :

Piston diameter	105 mm
Stroke length	180 mm
Distance between main bearings of crankshaft	200 mm
Maximum explosion pressure	3.2 MPa

The maximum torque position is when the crank makes 30^0 with IDC. The crankshaft is made of forged steel having permissible shear stress of 70 MPa & allowable tensile stress of 110 MPa. Draw the **front view** of centre crankshaft.