

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem- IV Remedial Examination December 2012

Subject code: 143401

Date: 27/12/2012

Subject Name: Machines and Mechanisms

Time: 02:30 – 05:00

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Define kinematic chain. State various types of kinematic chain? **07**
(b) Prove how the Grublers criterion is an extension of Kutzbach's theory. **05**
(c) State Grashoff's law. **02**
- Q.2** (a) Explain crank and slotted lever quick return mechanism. **07**
(b) Define inversion of mechanism and state the inversion of double slider crank chain? **07**
- OR**
- (b) Explain the pantograph mechanism with neat sketch. **07**
- Q.3** (a) Explain the Hooke's joint and double Hooke's joint. **07**
(b) Explain the types of cams and followers. **07**
- OR**
- Q.3** (a) Explain the cam nomenclature with neat sketch. **07**
(b) Explain the different motions of the follower. **07**
- Q.4** (a) The pitch of 50 mm mean diameter threaded screw of a screw jack is 12.5mm. The coefficient of friction between the screw and the nut is 0.13. Determine the torque required on the screw to raise a load of 25kN, assuming the load to rotate with the screw. Determine the ratio of the torque required to raise the load to the torque required to lower the load and also the efficiency of the machine. **07**
(b) Explain the single disc clutch with neat sketch. **07**
- OR**
- Q.4** (a) A multiple disc clutch has five plates having four pairs of active friction surfaces. If the intensity of pressure is not to exceed 0.127 N/mm^2 , find the power transmitted at 500 r.p.m. The outer and inner radii of friction surfaces are 125 mm and 75 mm respectively. Assume uniform wear and take coefficient of friction = 0.3. **07**
(b) Explain the gyroscopic effect in motor cycle, ship and aircraft. **07**
- Q.5** (a) The mass of flywheel of an engine is 6.5 tonnes and the radius of gyration is 1.8 metres. It is found from the turning moment diagram that the fluctuation of energy is 56 kN-m. If the mean speed of the engine is 120 r.p.m., find the maximum and minimum speeds. **07**
(b) How to obtain the magnitude and the direction of the balancing mass of several masses rotating in the same plane analytically? **07**
- OR**
- Q.5** (a) A riveting machine is driven by a constant torque 3 kW motor. The moving parts including the flywheel are equivalent to 150 kg at 0.6 m radius. One riveting operation takes 1 second and absorbs 10000 N-m of energy. The speed of the flywheel is 300 r.p.m. before riveting. Find the speed immediately after riveting. How many rivets can be closed per minute? **07**
(b) Write about Balancing of multi cylinder engine. **07**
