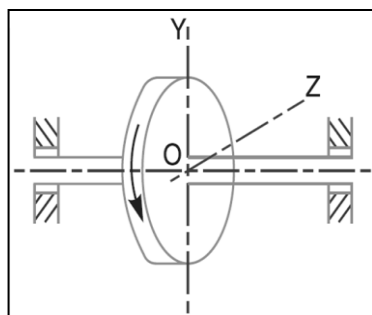


**GUJARAT TECHNOLOGICAL UNIVERSITY****PDDC - SEMESTER-V • EXAMINATION – SUMMER • 2014****Subject Code: X 51901****Date: 27-05-2014****Subject Name: Theory of Machine****Time: 02:30 pm - 05:00 pm****Total Marks: 70****Instructions:**

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

- Q.1** (a) A porter governor has two balls each of mass 3 kg and central load of mass 15kg. The arms are all 200 mm long, pivoted on axis. If the maximum and minimum radii of rotation of the balls are 160mm and 120mm respectively, find the range of speed. **07**
- (b) A simple band brake is operated by a lever of length 500mm. the brake drum has a diameter of 500mm and the brake band embraces  $\frac{5}{8}$  of the circumference. One end of the band is attached to the fulcrum of the lever while the other end is attached to a pin on the lever 100 mm from the fulcrum. If the effort applied to the end of the lever is 2 KN and the co-efficient of friction is 0.25, find the maximum braking torque on the drum. **07**
- Q.2** (a) Derive the equation of height in case of porter governor. **07**
- (b) Explain rope brake dynamometer and epicyclic train dynamometer. **07**
- OR**
- (b) Explain Dynamically equivalent system. **07**
- Q.3** (a) Derive an expression for tension ratio for band and block brake in terms of coefficient of friction, block of contact and number of blocks in the shoe. **07**
- (b) Explain Klien's construction method. **07**
- OR**
- Q.3** (a) Explain synthesis of function generation. **07**
- (b) State Chebyshev theorem and find three precession points for the function  $f(x)=X^{1.2}$  in the interval  $0 \leq X \leq 6$ . Take  $\theta_i = 60^\circ$ ,  $\Delta\theta = 90^\circ$ ,  $\phi_i = 50^\circ$  and  $\Delta\phi = 100^\circ$ . **07**
- Q.4** (a) A uniform disc of 200 mm diameter has a mass of 3 kg. It is mounted centrally in bearings which maintain its axle in a horizontal plane. The disc spins about its axle at 1000 r.p.m. While the axle rotates around its vertical axis at 60 r.p.m. in c/w direction viewing from top. If the distance between the bearings is 100 mm, find the resultant reaction at each bearing due to mass and gyroscopic effects. **07**



- (b) Explain the coefficient of fluctuation of energy and coefficient of fluctuation of speed. **07**

**OR**

- Q.4 (a)** Differentiate between Flywheel and Governor. **07**
- (b)** Explain the following terms with respect to governor. **07**
- (1) Sensitiveness
  - (2) Stability
  - (3) Isochronous governor
  - (4) Hunting
  - (5) Effort and Power
- Q.5 (a)** Draw and explain the turning moment diagram of a 4-stroke single cylinder engine. **07**
- (b)** A riveting machine is driven by 4 KW motor. The mass moment of inertia of rotating parts of machine is  $60 \text{ kg m}^2$  at the shaft on which the flywheel is mounted. At the starting of operation, the flywheel is making 200 rpm. If closing a rivet takes 2 sec and corresponding expenditure of energy is 10 KJ, find reduction of speed of flywheel and no. of rivets punched per hour. **07**
- OR**
- Q.5 (a)** Explain self locking and self energized brakes. **07**
- (b)** Explain - function generation, path generation and motion generation. **07**

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