

Seat  
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CBI1321

**Theory of Machine - II**  
**(New) (1040)**

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and attempts **any two** bits out of a, b and c from each question.
5. Solve graphical problems on drawing sheet only.
6. Use of non programmable calculator is allowed.
7. Assume suitable data, if necessary.

1. a) Write short note on : 10
- i) Beris - Gibson torsion dynamometer.
- ii) Self locking and self energised bracker.
- b) Explain the internal expanding shoe brake with the help of neat sketch ?  
Derive the relation between operating force, braking torque and other parameters of brake. 10
- c) A differential band brake is required to provide a braking torque of 200 Nm. The brake drum is 200 mm in diameter and the brake band subtends an angle of  $200^\circ$  with the centre of the brake drum. The coefficient of friction available is 0.25. The two ends of the brake band are attached to the two pins which are situated on two sides of fulcrum. Tight side of the band is attached to a pin which is at 50 mm from fulcrum.  
Calculate the distance of other pin from fulcrum so as to make the brake self actuating. Also calculate the cross sectional area of the band if the permissible tension for the band material is  $77 \text{ N/mm}^2$ . 10
2. a) Define : base circle, pitch point, trace point, pitch curve and pressure angle. 10
- b) Explain the following terms - 10
- i) Coefficient of fluctuation of energy and
- ii) Coefficient of fluctuation of speed.

- c) The following data relate to cam profile in which the follower moves with uniform acceleration and deceleration during ascent and descent. Minimum radius of cam = 25 mm. Roller diameter = 7.5 mm Light = 28 mm, offset of follower axis = 12 mm towards right, Angle of ascent =  $60^\circ$ , Angle of descent =  $90^\circ$ , Angle of dwell between ascent and descent =  $45^\circ$ , speed of the cam = 200rpm. Draw the profile of the cam. 10
3. a) Explain the following terms with respect to governor - 10
- i) Stability. ii) Isochronism
  - iii) Sensitiveness iv) Hunting
  - v) Controlling force.
- b) Explain what is meant by applied torque and reaction torque. Discuss the gyroscopic effect on sea vessels. 10
- c) The arms and links of a Porter Governor are each of 200 mm long. Each ball mass is 4 kg and the sleeve mass is 45 kg. The points of suspension of the arms and links are 30 mm and 40 mm from the axis of rotation of the spindle. If the radius of rotation of the balls is 100 mm, find :
- i) the speed of governor in rpm.
  - ii) the amount of insensitiveness at this speed, if the frictional resistance at the sleeve is 30 N and
  - iii) the coefficient of insensitiveness. 10
4. a) Give a detailed classification of gears. 10
- b) Derive a relation for minimum number of teeth on the gear wheel and the pinion to avoid interference. 10
- c) Two involute gears in mesh have a module of 6 mm and pressure angle of  $20^\circ$  the larger gear has 45 teeth while the pinion has 28 teeth. If they have a standard addendum, find :
- i) The contact ratio.
  - ii) The angle of action of the pinion and the gear wheel.
  - iii) The ratio of the sliding to rolling velocity.
    - a) at the beginning of contact
    - b) at the pitch point
    - c) at the end of contact. 10
5. a) Determine the unbalanced forces and couples in case of following in line engines :
- i) Four cylinder four stroke engine.
  - ii) Six cylinder four stroke engine. 10
- b) Explain the method of direct and reverse cranks to determine the unbalance forces in radial engines. 10
- c) Explain balancing of v-engines in detail. 10

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