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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ME) (2011 Onwards)
B.Tech.(Marine Engg.) (2013 Onwards)
(Sem.-3)

THEORY OF MACHINES-I

Subject Code : BTME-302

Paper ID : [A1139]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A** is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION-A**1. Write briefly :**

- a. Give classification of Kinematic link.
- b. What do you understand by instantaneous centre of rotation in kinematic of machines?
- c. Differentiate between a closed and open pair.
- d. Why a double Hooke's joint is used in practice?
- e. Define crowning of pulley.
- f. Enumerate any four different types of follower motions of a cam.
- g. Define the term "*Limiting Friction*".
- h. Why single cylinder needs large size flywheel?
- i. Define hunting of governors.
- j. Write the basic requirements for high speed cams.

SECTION-B

2. Draw a neat sketch and explain working of pantograph.
3. A leather belt is required to transmit 7.5 KW from a pulley 1.2 m in diameter, running at 250 r.p.m. The angle embraced is 165° and the coefficient of friction between the belt and pulley is 0.3. If the safe working stress for the leather belt is 1.5 MPa, density of leather 1 Mg/m^3 and thickness of belt is 10 mm, determine the width of the belt taking centrifugal tension into account.
4. What is the difference between a shoe brake and band brake? Describe them and state their applications.
5. In an engine governor of the Porter type, the upper and lower arms are 200 mm and 250 mm respectively and pivoted on the axis of rotation. The mass of the central load is 15 kg. The mass of each ball is 2 kg and friction of the sleeve together with the resistance of the operating gear is equal to a load of 24 N at the sleeve. If the limiting inclinations of the upper arms to the vertical are 30° and 40° , find, taking friction into account, range of speed of the governor.
6. Explain with diagram Ackerman Steering gear.

SECTION-C

7. Draw neat sketches of crank and slotted lever quick return mechanism and whitworth quick return motion mechanism. Explain the difference between two mechanisms and show the ratio of time taken for cutting and return stroke in both cases.
8. Construct the profile of a cam to suit the following specifications: Cam shaft diameter = 40 mm, Least radius of cam = 25 mm, Diameter of roller = 25 mm, Angle of lift = 120° , Angle of fall = 150° , Lift of the follower = 40 mm, Number of pauses are two of equal interval between motions. During the lift, the motion is S.H.M. During the fall the motion is uniform acceleration and deceleration. The speed of the cam shaft is uniform. The line of stroke of the follower is off-set 12.5 mm from the centre of the cam.
9.
 - a. Explain the following terms as applied to flywheel :
 - i) Fluctuation of energy.
 - ii) Coefficient of fluctuation of energy.
 - iii) Fluctuation of speed.
 - iv) Coefficient of Fluctuation of speed.
 - b. Explain the importance and use of Turning Moment Diagram of reciprocating engines.