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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Aerospace Engg.) (2012 Onwards)/(ANE) (Sem.-4)

THEORY OF MACHINES – I

Subject Code : ME-203

M.Code : 60517

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS 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. Answer briefly :**

- (a) Pentograph
- (b) Velocity ratio
- (c) Successfully constrained motion
- (d) Dynamometers
- (e) Hunting of governor
- (f) Kinematic pair
- (g) Flywheel
- (h) Degree of freedom
- (i) Stability of governor
- (j) Intermediate or counter shaft pulley

SECTION-B

2. What is a cam? What type of motion can be transmitted with a cam and follower combination? What are its elements? (1,1,3)
3. A linkage has 14 links and 5 numbers of loops. Calculate its degrees of freedom, number of joints and maximum number of ternary links that can be had. Assume that all pairs are turning pairs. (5)

4. What are centrifugal governors? How do they differ from inertia governors? (3,2)
5. Each arm of a Porter governor is 400 mm long. The upper arms are pivoted on the axis of the sleeve and the lower arms are attached to the sleeve at a distance of 40 mm from the axis. Each ball has a mass of 6 kg and the weight of the sleeve is 50 kg. Find the range of speed of the governor if the extreme radii of rotation of the balls are 260 mm and 300 mm. (5)
6. Explain absorption type dynamometer using neat diagram. (5)

SECTION-C

7. A crank and rocker mechanism ABCD has the following dimensions :
AB = 0.75 m BC = 1.25 m CD = 1.00 m AD = 1.5 m
BE = 437.5 mm CE = 87.5 mm CF = 500 mm
E and F are two points on the coupler link BC. AD is the fixed link. BEC is read clockwise and F lies on BC produced. Crank AB has an angular velocity of 20.94 rad/s counter-clockwise and a deceleration of 280 rad/s^2 at the instant $\angle DAB = 60^\circ$. Find the
 - (a) instantaneous linear acceleration of C, E and F (5)
 - (b) instantaneous angular velocities and accelerations of links BC and CD. (5)
8. Two parallel shafts, 3.5 m apart, are connected by two pulleys of 100 mm and 400 mm diameters, the larger pulley being the driver runs at 220 rpm. The belt weighs 1.2 kg per meter length. The maximum tension in the belt is not to exceed 1.8 kN. The coefficient of friction is 0.28. Owing to slip on one of the pulleys, the velocity of the driven shaft is 520 rpm only. Determine (10)
 - a) torque on each shaft,
 - b) power transmitted,
 - c) power lost in friction
 - d) efficiency of the drive.
9. Write notes on the following :
 - a) Principle of inversion and inversion of a four-bar chain (5)
 - b) Turning moment diagram for reciprocating machines and its importance (5)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.