

B.TECH
(SEM VI) THEORY EXAMINATION 2022-23
THEORY OF MACHINES

Time: 3 Hours

Total Marks: 70

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

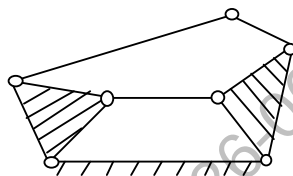
1. Attempt *all* questions in brief. 2 x 7 = 14
- Discuss mechanism with the help of suitable sketch.
 - Explain rigid and resistant bodies?
 - Explain the terms: (i)line of action, (ii)Module, (iii)Pressure Angle and (iv) Addendum
 - Discuss the law of gearing.
 - What is dynamic balancing?
 - Explain the balancing of low speed reciprocating engine.
 - Describe dynamometer.

SECTION B

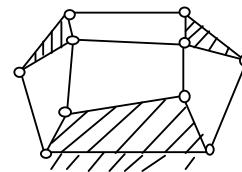
2. Attempt any *three* of the following: 7 x 3 = 21
- Discuss different types of kinematic pair with the help of suitable sketch?
 - Derive the equation of the degree of freedom of planer mechanism (Gruebler criterion).
 - Explain and derive the expression for length of path of contact.
 - Discuss the force analysis of slider crank mechanism.
 - Compare centrifugal governor and inertia governor with the help of neat sketch.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7
- (a) For the kinematic linkages shown in Fig.A calculate the degree of freedom (F).



(a)



(b)

Fig.A

- (b) With the help of suitable diagram locate different I centre of slider crank mechanism.
4. Attempt any *one* part of the following: 7 x 1 = 7
- List the difference between involute and cycloidal profiles of gear tooth.
 - What do you mean by interference; analyze the suitable remedial methods to

avoid it.

5. Attempt any one part of the following:

7 x 1 = 7

- (a) In a four link mechanism, the dimensions of links are as under: AB=55 mm, BC=66 mm, CD=50 mm and AD=100 mm. Link AD is fixed. At the instant when $\angle DAB=60^\circ$, the link AB has an angular velocity 10.5 rad/s in the counter clockwise direction and an angular acceleration of 26 rad/s^2 . Analyze the
 - (i) Velocity and acceleration of point C
- (b) In a slider crank mechanism, the crank is 400 mm long and rotates at 20 rad/s in the counter-clockwise direction. The length of connecting rod is 1.4 m. When the crank turns 60° from the inner dead –centre, illustrate the velocity of slider using relative velocity method.

6. Attempt any one part of the following:

7 x 1 = 7

- (a) Draw the profile of a cam operating a knife-edge follower having a lift of 40 mm. The cam raises the follower with constant acceleration and deceleration for 120° of the rotation followed by a period of dwell for 60° . The follower descends for next 100° rotation of the cam with uniform velocity, again followed by a dwell period. The cam rotates at a uniform velocity of 100 rpm and has a least radius of 30mm.
- (b) Draw the profile of a cam operating a knife-edge follower having a lift of 30 mm. The cam raises the follower with uniform velocity for 150° of the rotation followed by a period of dwell for 60° . The follower descends for next 100° rotation of the cam with uniform velocity, again followed by a dwell period. The cam rotates at a uniform velocity of 120 rpm and has a least radius of 20mm.

7. Attempt any one part of the following:

7 x 1 = 7

- (a) A circular disc mounted on a shaft carries three attached masses of 4kg, 3 kg and 2.5 kg at radial distances of 75 mm and 85mm and 50 mm and at angular positions of 45° , 135° and 240° respectively. The angular positions are measured counterclockwise from the reference line along the x-axis. Determine the amount of the counter mass at a radial distance of 75 mm required for the static balance.
- (b) Three masses of 8 kg, 12kg and 15 kg attached at radial distance of 80mm, 100mm and 60mm respectively to a disc on a shaft are in complete balance. Determine the angular positions of the masses of 12 kg and 15 kg relative to the 8 kg mass.