



### Sanjay Ghodawat University, Kolhapur

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

2018-19  
EXM/P/09/01

<b>Year and Program:</b> SY B. Tech	<b>School:</b> Technology	<b>Department:</b> Mechanical Engg.
<b>Course Code:</b> MET206	<b>Course Title:</b> Kinematics of Machines	<b>Semester:</b> II
<b>Day and Date:</b> Saturday 25-05-2018	<b>End Semester Examination (ESE)</b>	<b>Time:</b> Max Marks: 100 10:30 am to 1:30 PM

- Instructions:**
- 1) All questions are compulsory.
  - 2) Assume suitable data wherever necessary.
  - 3) Figures to the right indicate full marks.

Q.1		Marks	Bloom's Level	CO
a)	What are the different types of constrained motions? Explain with neat sketch.	04	L <sub>1</sub>	CO1
b)	Derive the condition for correct steering and explain any one steering gear mechanism satisfying this condition.	06	L <sub>3</sub>	CO1
<b>OR</b>				
b)	A Hooke's joint is used to connect two shafts. The driving shaft rotates at a uniform speed of 1000 rpm. Determine the greatest permissible angle between the axis of shafts so that the total fluctuation of speed may not exceed 150 rpm. Also find the maximum and minimum speeds of driven shaft.	06	L <sub>3</sub>	CO1
<b>Q.2</b>				
a)	In a Whitworth quick return mechanism as shown in fig.1, OA is a crank rotating at 30 r.p.m. in clockwise direction. The dimensions of various links are : OA = 150 mm, OC = 100 mm, CD = 125 mm and DR = 500 mm. Determine: Velocity of slider R	08	L <sub>4</sub>	CO2
b)	Derive the equation for friction torque in case of flat pivot bearing assuming uniform wear with usual notation.	08	L <sub>3</sub>	CO3

**ESE**

Page 1/3

		<b>OR</b>			
	b)	The thrust in the marine engine is taken up by multi-collared shaft and is equal to 150 kN. The speed of the shaft is 90 rpm. Assuming uniform pressure equal to 0.3 N/mm <sup>2</sup> and if the outer diameter is 1.5 times the inner diameter, find the internal and external diameters of the collar. Also find the number of collars required if the power lost in friction is not to exceed 15 kW. Take $\mu = 0.05$ .	08	L <sub>3</sub>	CO3
<b>OR</b>					
Q.3					
	a)	From the following data draw the profile of cam in which follower moves with SHM during ascent and with uniform acceleration and retardation during descent: Minimum radius of cam = 50 mm, Angle of ascent = 48°, Angle of Dwell = 42°, Angle of Descent = 60°, Lift of follower = 40 mm, Roller Diameter = 30 mm Distance between line of action of the follower and Axis of cam = 20mm.	10	L <sub>3</sub>	CO4
	b)	Draw Displacement, velocity and acceleration diagram for follower moving with SHM.	04	L <sub>1</sub>	CO4
<b>OR</b>					
	b)	Explain terminology of cam and follower.	04	L <sub>1</sub>	CO4

Q.4					
	a)	Explain construction and working of Hartnell governor with the help of neat Sketch.	10	L <sub>2</sub>	CO5
	b)	In a spring loaded Hartnell governor the extreme radii of rotation of the balls are 80 mm and 120 mm. The ball arm and sleeve arm of the bell crank lever are equal in length. The mass of each ball is 2 Kg. If the speeds at the two extreme positions are 400 and 420 rpm. Find the initial compression of the central spring and spring constant. Neglect weight of sleeve.	12	L <sub>3</sub>	CO5
<b>OR</b>					
	b)	In a Porter governor, the mass of central load is 18 Kg and mass of each ball is 2 Kg. The top arms are 250 mm while the bottom arms are each 300 mm long. The friction of sleeve is 14 N. If top arms make 45° with the axis of rotation in the equilibrium position, find the range of speed of governor in that position.	12	L <sub>3</sub>	CO5
Q.5					
	a)	Explain controlling force curve.	08	L <sub>2</sub>	CO5
	b)	An open belt drive transmits 2.5 kW power. The linear velocity of belt is 2.5 m/s. The angle of lap on smaller pulley is 165° and Coefficient of friction is 0.3. Determine the effect on power transmission in the following cases: i) Initial tension in the belt is increased by 8% ii) Angle of lap is increased by 8% for the same speed and tension on	12	L <sub>3</sub>	CO6

**ESE**

Page 2/3

	the tight side. iii) Coefficient of friction is increased by 8% by suitable dressing to the friction surface of the belt and initial tension is same.			
	<b>OR</b>			
	b) A shaft rotating at 200 r.p.m. drives another shaft at 300 r.p.m. and transmits 6kW through a belt. The belt is 100 mm wide and 10 mm thick. The distance between the shafts is 4m. The smaller pulley is 0.5m in diameter. Calculate the stress in belt, if it is i) An open belt drive and ii) A cross belt drive. Take coefficient of friction as 0.3. Neglect belt thickness while calculating velocity.	12	L <sub>3</sub>	CO6
Q.6				
	a) Explain belt transmission dynamometer with the help of neat sketch.	08	L <sub>2</sub>	CO6
	b) Derive expression for limiting tension ratio in V-belt drive.	10	L <sub>3</sub>	CO6

\*\*\*\*\*

**CSE**

Page 3/3