

# Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

USN

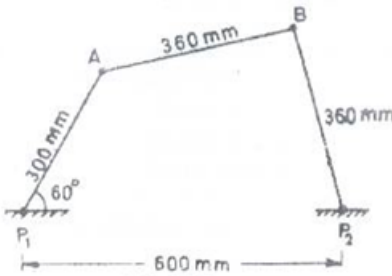
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## Fourth Semester B.E. Degree Examination Mechanism and Machine Theory

TIME: 03 Hours

Max. Marks: 100

- Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.  
02. .  
03. .

Module -1			
Q.01	a	Distinguish between: i) Kinematic pair and kinematic chain ii) Structure and frame	6
	b	Find the degree of freedom of four bar chain mechanism.	8
	c	Explain the pantograph mechanism, with neat sketch and state its application	8
OR			
Q.02	a	Explain with neat sketch quick return mechanism, where are they used.	10
	b	Derive an expression for necessary condition of correct steering and explain Ackermann steering gear with neat sketch.	10
Module-2			
Q. 03	a	State the application in which Coriolis components of acceleration occurs.	2
	b	The dimensions and configuration of a four bar mechanism is as shown in fig.3(b) the crank P1A has an angular velocity of 10 rad/sec and an angular acceleration of 30 rad/sec <sup>2</sup> . Both clockwise. Determine the angular velocities and angular accelerations of links P2B and AB and the velocity and acceleration of the point B.  fig Q. 03(b)	18
Q.04	a	With neat sketch explain the role of “friction in the force analysis of a mechanism which has turning pairs.	4
	b	A four bar mechanism under the action of two external forces shown in the fig Q.04(b) Determine the torque to be applied on the link AB for static equilibrium. The dimension of the link as AB=50mm, BC=66mm, CD=55mm, CE=25mm, CF=30mm, BAD =60° and AD = 100mm.	16

		Q.04(b)	
		<b>Module-3</b>	
Q. 05	a	Explain the different types of gear train with neat sketches.	8
	b	A pair of gear has 16 teeth and 18 teeth, a module 12.5mm, addendum 12.5mm and a pressure angle 14.5 degrees. Prove that the gear have interference. Determine the minimum number of teeth and the velocity ratio to avoid the interference.	12
		OR	
Q. 06	a	Derive expression for length of path of contact and arc of contact for a pair of involute gear in contact.	8
	b	Fig shows epicycle gear train where the arm A the driver and annular gear D is the follower. The wheel D has 112 teeth and B has 48 teeth. B runs freely on pin P and D is separately driven. The arm A run at 100 rpm and wheel D at 50 rpm in same direction, find the speed of wheel B and C	14
		Q.06(b)	
		<b>Module-4</b>	
Q. 07	a	What do you mean by static balancing and dynamic balancing? A shaft running in bearing?	4
	b	Four masses of magnitude 5, 6, 7 and M Kg revolve in planes A, B, C, and D respectively the plane are spaced A to B 0.8m, A to C 1.2m, A to D 2m. The masses are all at the same radius. Find the magnitude of M and the relative angular position of the masses for the complete balance.	16
		OR	
Q. 08	a	Describe direct and reverse crank method of determines the unbalanced forces in radial engines	6
	b	An air compressor fitted with a 3-cylinder radial engine operates at a speed of 1200rpm the length of each connecting rod is 225mm. the stroke is 150mm and the mass of the	14

		reciprocating parts per cylinder is 0.2kg. Calculate the distributing masses and explain the method of balancing them.	
		<b>Module-5</b>	
Q. 09	a	Define: i) Sensitiveness ii) Isochronous governor iii) Hunting of governors iv) Governor effort v) Stability of a governor.	10
	b	In a spring controlled Hartnell type governor, the extreme radii of rotation of the balls 80mm and 120mm. the ball arm and the sleeve arm of the bell crank lever are equal length , the mass of each ball is 2kg. if the speed at the extreme positions are 400rpm and 420rpm. Find i) The initial compression of the central spring ii) The spring constant.	
		<b>OR</b>	
Q. 10	a	Derive an expression to determine the speed of the porter governor.	6
	b	Each road wheel of a motor cycle has a moment of inertia of $2 \text{ kg m}^2$ . The rotating parts of the engine of the motor cycle has a moment of inertia of $0.2 \text{ kg m}^2$ . The speed of the engine is 5 times the speed of the wheel and is in the same sense. The mass of the motor cycle with rider is 200 kg and its C.G. is 500 mm above the ground level. The diameter of the wheel is 500 mm. The motor cycle is traveling at 15 m/sec on a curve of 30 m radius. Determine i) Gyro couple centrifugal couple, overturning couple and balancing couple in terms of angle of heel and ii) Angle of heel.	14