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

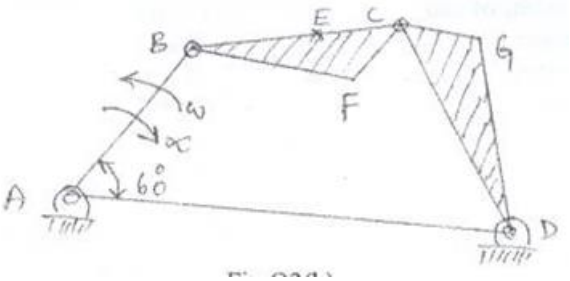
USN | | | | | | | | | | |

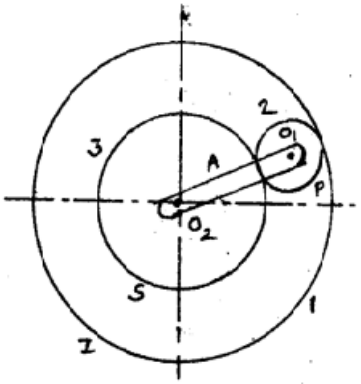
Fourth Semester B.E. Degree Examination

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) Higher pair and lower pair ii) Mechanism and Machine	4
	b	Sketch and explain whit worth quick return motion mechanism.	8
	c	Find the degree of freedom of slider crank chain mechanism.	8
		OR	
Q.02	a	Explain with help of neat sketch : a) Robert mechanism b) straight line mechanism	8
	b	Sketch and explain the working of an elliptical trammel. Prove that it traces an ellipse	12
		Module-2	
Q. 03	a	State the reason for velocity and acceleration analysis	4
	b	The fig shows four bar mechanism. The link AB rotates with an angular velocity of 10.5rad/sec and retardation of 26 rad/sec2 in the directions shown. Find (i) the angular acceleration of the links BC and CD ii) Linear accelerations of point E, F and G.  Q. 03(b)	16
Q.04	a	Explain principle of virtual work application to static force analysis.	6
	b	In the slider crank mechanism crank length is 500mm, connecting rod length is 1000mm a load on the piston is 100N. Using force polygon method and neglecting friction, determine the torque on the crank for static equilibrium when the crank makes 45^0 with the like stroke.	14
		Module-3	
Q. 05	a	State and derive law of gearing.	8
	b	Two 20o involute spur gears mesh externally and give a velocity ratio of 3. Module is 3mm and the addendum is equal to 1.1 module. If the pinion rotates at 120rpm, determine : i) the minimum number of teeth on each wheel to avoid interference. ii) The number of teeth in contact.	12
		OR	

Q. 06	a	Explain epicycle gear train with neat sketch	8
	b	An epicycle gear train consists of three gears 1, 2 and 3 as shown in Fig.06 (b), the internal gear 1 has 72 teeth and gear 3 has 32teeth. The gear 2 meshes with both gear 1 and 3 and is carried on arm A which rotates about center O2 at 20 rpm. If the gear 1 is fixed, determine the speed of gear 2 and 3.  Q.06 (b)	12
		Module-4	
Q. 07	a	Explain static and dynamic balancing.	4
	b	A shaft running in bearing carries masses 20, 30 and 40 kg in planes A, B and C with C.G. from the axis of the shaft 30 mm, 20 mm and 15 mm respectively. The distances of planes B and C from A are 1000 mm and 2000 mm to the right of A. The relative angular positions of the C.G of the unbalanced masses are such that they are in static balance. To obtain complete dynamic balance suitable masses are introduced in planes D and E with C.G. 100 mm from the axis. D is 500 mm to the left of A and E 500 mm to the right of C. Determine the position and magnitude of the balancing masses	16
		OR	
Q. 08	a	Explain 'direct and reverse crank' method of determining the unbalanced forces in radial engines.	6
	b	The following data refer to a twin V-engine. Angles between the cranks: 90o, Mass of rotating parts of the crank: 1.5 kg. Mass of each piston is I kg. Mass of connecting rod: 1.5 kg. Length ofcrank:60 mm, length of connecting rod:240 mm. Distance of C.G from gudgron pin is 140 mm. Prove that the primary forces due to reciprocating parts can be balanced by rotating parts. Hence assuming that connecting rod mass can be divided into two equivalent masses at gudgron pin and crank pin centers, find the balancing mass required to balance the rotating parts and primary forces due to reciprocating parts at radius 100 mm. If the engine runs at 1200 rpm, what is the maximum magnitude of secondary force and the corresponding crank position?	14
		Module-5	
Q. 09	a	Explain the effect of gyroscope on a ship under i) Steering ii) Pitching and iii) Rolling	8
	b	Each rod wheel of a moter cycle as of 600mm diameter and has a moment of inertia 1.1kg-m2. The motor cycle and a rider together weigh 220kg and combined center of masses 620mm, above the ground level wheel the motor cycle is upright the moment of inertia of rotating parts of the engine is 0.18kh-m2 . the engine rotates at 4.5 times the speed of the wheel in the same sense. Find the angle of heel necessary when the motor cycle is turn of 35 m radius at a speed of 72Km/hr.	14
		OR	
Q. 10	a	Derive an expression to determine the speed of the porter governor.	6

	b	A porter governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and the mass of the central load on the sleeve is 25 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and 200 mm when the governor is at maximum speed. Find the range of speed, sleeve lift, governor effort and power of the governor in the following cases: i) When the friction at the sleeve is neglected. ii) When the friction at the sleeve is equivalent to 10 N.	14