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

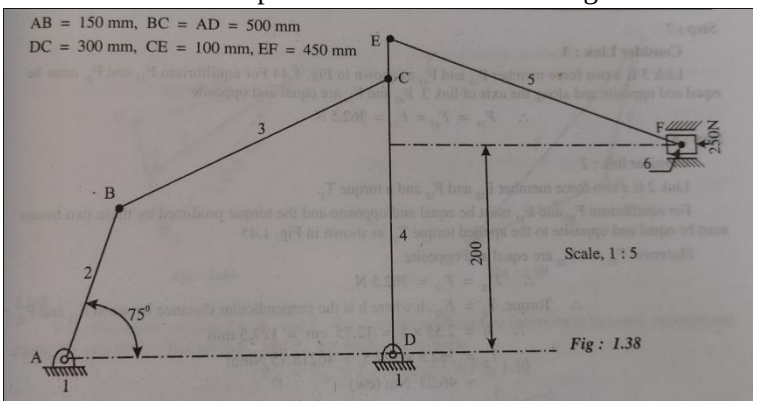
USN | | | | | | | | | | |

Fifth Semester B.E. Degree Examination

Dynamics of Machines

TIME: 03 Hours **Max. Marks: 100**

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

		Module – 1	
Q.1	**(a)**	Consider a slider crank mechanism state and explain principle of virtual work.	08
	(b)	Determine the various forces and couple T2 as shown in below figure 	12
		OR	
Q.2	**(a)**	Determine the forces acting reciprocating parts of engine neglecting weight of of connecting rod. Piston effort, force on connecting rod, thrust on cylinder wall, crank pin effort, turning moment.	12
	(b)	Find the inertia force for following data on IC engine. Bore = 175 mm stroke equals 200mm engine speed equals 500 RPM length of connecting rod equals 400 mm crank angle = 60 degree from top dead centre Mars reciprocating parts equals 180 kgs by graphical method and analytical method.	08
		Module – 2	
Q.3	**(a)**	Discuss s different ways of balancing of rotating masses.	08
	(b)	Three masses M1 M2 hindimp3 with 10, 9 and 16 kg respectively revolves in the same plane with radius 100, 125 and 50 mm. Angular position of masses M2 and M3 are 60 degree and 135 degree from M1. Determine the position and the magnitude of M4 at radius 150 mm to balance the system.	12
		OR	
Q.4	**(a)**	Derive an expression for the cdial unbalanced force at any instant in partial primary balancing.	08
	(b)	The Crank ok and connecting rod of a 4 cylinder inline engine running at 1800 RPM are 50 millimetre, 250 millimetre each respectively and the cylinders are spaced 150 mm apart full stop if the cylinders are numbered 1 to 4 in sequence from one end and the crank appears at interval of 90 degree e in an end view in the order 1423.the reciprocating mass corresponding to each cylinder is 1.5 kg. Determine unbalanced primary and secondary forces if any, unbalanced primary and secondary couple with reference to Central plane of engine.	12
		Module – 3	

Q.5	**(a)**	Differentiate between flywheel and governor.	08
	(b)	A porter governor has arms 250 mm long, each are pivoted on the axis of rotation. Masses of each governor ball is 2 kg. At the mean speed of 200 RPM, it is found that centrifugal force extend at each ball is 100 Newton. Neglecting friction, determine the central load if the sleeve movement is restricted to plus or minus 20mm. Also determine the range of speed .	12
		OR	
Q.6	**(a)**	Define sensitiveness, hunting, stability, governor effort and isochronous governor	10
	(b)	Tqhe mass of each Ball of a spring controlled governor is 1.4 kg. The bell crank lever as its vertical arm 90mm and horizontal arm 40mm for stop the distance of fulcrum from the axis of rotation is 45mm. Just leave as a mass of 7.5 kg the skew begins to rise at 220 RPM. The rise of the sleeve for 6 % ries in speed is 8 mm full stop find the initial thrust of the spring and its stiffness.	10
		Module – 4	
Q.7	**(a)**	Discuss the laws of solid friction.	08
	(b)	Derive an expression for total frictional torque of flat pivot bearing considering uniform pressure and uniform wear.	12
		OR	
Q.8	**(a)**	Derive an expression for ratio of belt tension.	10
	(b)	a shaft rotates at 250 RPM drives another shaft at 350 RPM and transmits 8 KW through a belt of 100 mm wide and 10 mm thick full stop the distance between the shaft is 4 metre Full stop the smaller Pulley is 0.5 metre diameter. Calculate the stress in the belt if it is open belt drive and also calculate for cross belt drive. Assume coefficient of friction as 0.3.	10
		Module – 5	
Q.9	**(a)**	Derive an expression for gyroscopic couple considering a body rotating about Axis.	08
	(b)	Discuss the gyroscopic effect on aeroplane.	12
		OR	
Q.10	**(a)**	Derivean expression for displacement, velocity e and acceleration of follower when the roller is in contact with straight flank in case of tangent cam with roller follower.	10
	(b)	Forest symmetrical tangent cam operating a roller follower the least radius of CAM is 30 mm and roller radius is 15 mm full stop the angle of ascent is 60 degree the total lift is 15 mm and the speed of a cam shaft is 300 RPM full stop calculate principal dimension of cam.	10

Table showing the Bloom's Taxonomy Level, Course Outcome and Programme Outcome

Question		Bloom's Taxonomy Level attached	Course Outcome	Programme Outcome
Q.1	(a)	L2	CO1	1,2,3
	(b)	L3	CO1	1,2,3
	(c)			
Q.2	(a)	L3	CO1	1,2,3
	(b)	L2	CO1	1,2,3
	(c)			
Q.3	(a)	L3	CO2	1,2,3
	(b)	L3	CO2	1,2,3
	(c)			
Q.4	(a)	L3	CO2	1,2,3
	(b)	L4	CO2	1,2,3
	(c)			
Q.5	(a)	L2	CO3	1,2,3
	(b)	L3	CO3	1,2,3
	(c)			
Q.6	(a)	L3	CO3	1,2,3
	(b)	L2	CO3	1,2,3
	(c)			
Q.7	(a)	L2	CO4	1,2,3
	(b)	L3	CO4	1,2,3
	(c)			
Q.8	(a)	L2	CO4	1,2,3
	(b)	L3	CO4	1,2,3
	(c)			
Q.9	(a)	L3	CO5	1,2,3
	(b)	L3	CO5	1,2,3
	(c)			
Q.10	(a)	L2	CO5	1,2,3
	(b)	L3	CO5	1,2,3
	(c)			

Bloom's Taxonomy Levels	**Lower order thinking skills**		
	Remembering(knowledge):L_1	Understanding Comprehension): L_2	Applying (Application): L_3
	Higher order thinking skills		
	Analyzing (Analysis): L_4	Valuating (Evaluation): L_5	Creating (Synthesis): L_6

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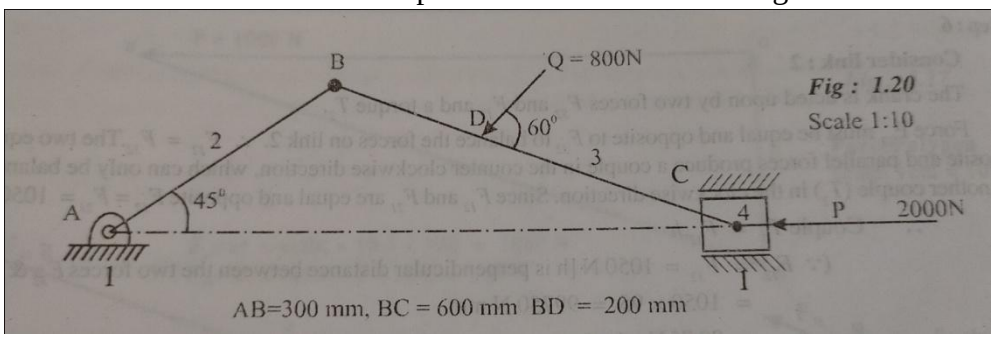
Fifth Semester B.E. Degree Examination

Dynamics of Machines

TIME: 03 Hours **Max. Marks: 100**

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

		Module – 1	
Q.1	**(a)**	Discuss equilibrium of two force member, three force member and member with two force and a torque.	08
	(b)	Determine the various forces and couple T2 as shown in below figure 	12
		OR	
Q.2	**(a)**	State and explain D'Alembert's principle.	08
	(b)	When the crank is 45 degree from the IDC of the downstroke, the the effective steam pressure on the piston of a a vertical steam engine is 2.5 bar. The diameter of the cylinder is 0.75 metre coma stroke of the piston is 0.5 metre and length of connecting rod is 1 metre. Determine the torque on the crankshaft, if the engine runs at 350 RPM and the mass of reciprocating part is 200kg.	12
		Module – 2	
Q.3	**(a)**	What is static and dynamic balancing? Why is balancing of rotating masses necessary?	08
	(b)	Five masses M1 M2 M3 M4 and M5 revolves in the same plane. Magnitude of M1 M2 and M3 are 5, 2.5 and 4 kg respectively angular position of M2 M3 M4 and M5 are 60 degree 135 degree to 10 degree and 270 degree from M1 determine the masses M4 and M5.	12
		OR	
Q.4	**(a)**	Derive an expression for the residual unbalanced force at any instant in partial primary balancing.	10
	(b)	Prove that the resultant unbalanced force is minimum when off of the reciprocating masses are balanced by rotating masses. when c is equal to 0.5.	10
		Module – 3	
Q.5	**(a)**		08

		Differentiate between flywheel and governor.	

	(b)	A double acting steam engine develops 350 KW at 120 RPM. It is fitted with a flywheel of radius of gyration 2.5 metres full stop the coefficient of fluctuation of energy is 0.1 full stop the speed of flywheel is not to develop more than 0.5 % from the mean speed full stop find the mass of flywheel.	12
OR			
Q.6	**(a)**	Define sensitiveness, hunting, stability, governor effort and isochronous governor	10
	(b)	The arms of porter governor are are 30 cm long full stop upper are devoted to the axis of rotation. Your arms are attached to the sleeve at a distance 3.75 cm from the axis. The mass of the sleeve is 75 kg. Mass of each ball is 10 kg. Determine the equilibrium speed when radius of the ball is 22.5 CM. What will be the range of speed for this position if the frictional resistance of the sleeve is 24.5 Newton. Find also coefficient of insensitiveness.	10
Module – 4			
Q.7	**(a)**	Discuss the laws of solid friction.	08
	(b)	Derive an expression for total frictional torque of flat coller bearing considering uniform pressure and uniform wear.	12
OR			
Q.8	**(a)**	Derive an expression for effect of centrifugal tension.	10
	(b)	Two Pulley one 450 mm diameter and other 200 mm diameter on parallel shaft 1.95 metre apart and are connected by crossbelt. Find the length of the belt angle of contact between belt and Pulley. What power can be transmitted by the belt when large Pulley rotates at 200 RPM if maximum permissible tension in the belt is 1KN and quotient of friction is 0.25 in stock	10
Module – 5			
Q.9	**(a)**	Derive an expression for gyroscopic couple considering a body rotating about Axis.	08
	(b)	Discuss the gyroscopic effect on Ships.	12
OR			
Q.10	**(a)**	Derivean expression for displacement, velocity e and acceleration of follower when the roller is in contact with the nose in case of tangent cam with roller follower.	10
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