QUESTION PAPER CODE- 54023

University Institute of Engineering & Technology

(Recognised Under Section 2(f) and 12B of UGC)

Kurukshetra University, Kurukshetra

		Roll No. -
THEORY EXAMINATION – MAY, 2019		TIME – 3 Hrs.
B.TECH. (ME)	SEMESTER – IV	M.M. - 75
PAPER–ME-210	SUBJECT – DYNAMICS OF MACHINES	

Note: All questions in Part-A and Part-B are compulsory. Attempt any four questions from Part-C selecting at least one from each unit.

PART-A (15 Marks)

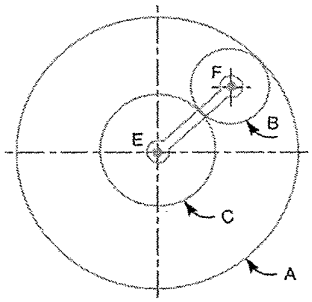
Q. No. – 1 Answer the following questions carrying one mark each. 15x1=15

(i)	What is the difference between right handed helical gears and left handed helical gears?
(ii)	Define the angle of obliquity.
(iii)	In a gear train, when the axes of the shafts, over which the gears are mounted, move relative to a fixed axis, is called_____.
(iv)	What is meant by applied and constraint forces?
(v)	Define the principle of virtul work.
(vi)	What is meant by piston effort and crank effort?
(vii)	What is fly wheel? What is its use?
(viii)	Static balancing involves balancing of _____.
(ix)	What do you understand by self-locking and self-energised brakes?
(x)	Define sensitiveness of governor.
(xi)	The force acting on the sleeve for a governor running at a constant speed is_____.
(xii)	How does a governor differ from flywheel?
(xiii)	Define module. What is its significance?
(xiv)	Differentiate between involute and cycloidal tooth profile.
(xv)	What do you understand by path of contact and arc of contact in gears?

PART-B (20 Marks)

	UNIT-I	
2	Define and explain the superposition theorm as applicable to a system of forces acting on a mechanism.	05
	UNIT-II	
3	A pair of bevel gears is mounted on two intersecting shafts whose shaft angles are 72 ° to each other. The velocity ratio of the gears is 2. Find the pitch angles.	05
	UNIT-III	
4	A bicycle and rider, travelling at 12 km/h on a level road, have a mass of 105 kg. A brake is applied to the rear wheel which is 800 mm in diameter. The pressure on the brake is 80 N and the coefficient of friction is 0.06. Find the distance covered by the bicycle and the number of turns of its wheel before coming to rest.	05
	UNIT-IV	
5	What do you understand by primary and secondary balancing? Explain why only a part of the unbalanced force due to reciprocating masses is balanced by revolving mass.	05

PART-C (40 Marks)

	UNIT-I	
6	In a vertical double acting steam engine, the connecting rod is 4.5 times the crank. The weight of the reciprocating parts is 120 kg and the stroke of the piston is 440 mm. The engine runs at 250 rpm. If the net load on the piston due to steam pressure is 25 kN when the crank has turned through an angle of 120 degree from the TDC. Determine: **a.** thrust in connecting rod **b.** pressure on slide bars **c.** tangential force on crank pin **d.** thrust on bearings **e.** turning moment on the crankshaft.	10
7	Describe the graphical method of considering the inertia of connecting rod of a reciprocating engine.	10
	UNIT-II	
8	A pair of 20° full depth involute spur gears having 30 and 50 teeth respectively of module 4 mm are in mesh. The smaller gear rotates at 1000 r.p.m. Determine: 1. sliding velocities at engagement and at disengagement of pair of a teeth, and 2. contact ratio.	10
9	An epicyclic gear consists of three gears A, B and C as shown in Fig. 1. The gear A has 72 internal teeth and gear C has 32 external teeth. The gear B meshes with both A and C and is carried on an arm EF which rotates about the centre of A at 18 r.p.m. If the gear A is fixed, determine the speed of gears B and C.  Fig. 1	10
	UNIT-III	
10	Explain the terms and derive expressions for 'effort' and 'power' of a Porter governor.	10

11	A band and block brake, having 14 blocks each of which subtends an angle of 15° at the centre, is applied to a drum of 1 m effective diameter. The drum and flywheel mounted on the same shaft has a mass of 2000 kg and a combined radius of gyration of 500 mm. The two ends of the band are attached to pins on opposite sides of the brake lever at distances of 30 mm and 120 mm from the fulcrum. If a force of 200 N is applied at a distance of 750 mm from the fulcrum, find: 1. maximum braking torque, 2. angular retardation of the drum, and 3. time taken by the system to come to rest from the rated speed of 360 r.p.m. The coefficient of friction between blocks and drum may be taken as 0.25.	**10**
	UNIT-IV	
12	What is gyroscopic couple? Derive a relation for its magnitude. Explain the gyroscopic effects on four-wheeled vehicles.	**10**
13	A shaft has three eccentrics, each 75 mm diameter and 25 mm thick, machined in one piece with the shaft. The central planes of the eccentric are 60 mm apart. The distance of the centres from the axis of rotation are 12 mm, 18 mm and 12 mm and their angular positions are 120° apart. The density of metal is 7000 kg/m^3. Find the amount of out-of-balance force and couple at 600 r.p.m. If the shaft is balanced by adding two masses at a radius 75 mm and at distances of 100 mm from the central plane of the middle eccentric, find the amount of the masses and their angular positions.	**10**