

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, November 2016

B. Tech. in Mechanical Engineering, Semester V

Roll No.....

ME 507: Dynamics of Machines

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.
4. Drawing sheet is available for drawing purposes.

Q.1A	Objective type multiple choice questions (10 questions @ 1 mark)	10
i.	The two parallel and coplanar shafts are connected by gears having teeth parallel to the axis of the shaft. This arrangement is called (a) spur gearing (b) helical gearing (c) bevel gearing (d) spiral gearing	
ii.	When two pulleys of different diameters are connected by means of an open belt drive, then the angle of contact taken into consideration should be of the: (a) large pulley (b) smaller pulley (c) average of two pulleys.	
iii.	For dynamic balancing of a shaft (a) the net dynamic force acting on the shaft is equal to zero (b) the net couple due to dynamic forces acting on the shaft is equal to zero (c) both (a) and (b) (d) none of the above	
iv.	The size of a gear is usually specified by (a) pressure angle (b) circular pitch (c) diametral pitch (d) pitch circle diameter	
v.	What is meant by pitching of ship: (a) up and down motion of bow and stern along transverse axis (b) up and down motion of bow and stern along longitudinal axis (c) up and down motion of port and starboard along transverse axis (d) none of the above	
vi.	The brake commonly used in motor cars is: (a) shoe brake (b) internal expanding brake (c) band brake (d) band and block brake	
vii.	The balancing of rotating and reciprocating parts of an engine is necessary when it runs at (a) slow speed (b) medium speed (c) high speed	
viii.	The size of a cam depends upon: (a) base circle; (b) pitch circle; (c) prime circle; (d) pitch curve	
ix.	The angle between the direction of the follower motion and a normal to the pitch curve is called: (a) pitch angle (b) pressure angle (c) prime angle (d) base angle	
x.	The contact ratio for gears is (a) zero (b) less than one (c) greater than one	
Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
i.	Discuss various types of the brakes.	
ii.	What do you understand by 'initial tension' in a belt?	
iii.	Why is balancing of rotating parts necessary for high speed engines?	
iv.	Define the term 'Controlling force' relating to governor.	

Q.3A	Define the following terms as applied to Cam with a neat sketch (1) Base circle (2) Pressure angle	05
Q.3B	What do you understand by the term 'interference' as applied to gears?	05
Q.4A	Explain centrifugal tension in a belt.	05
Q.4B	Explain with a sketch the effect of gyroscopic couple on a Naval ship during steering taking a right turn.	05
Q.5	Derive the formula for gyroscopic couple on a Naval ship during pitching.	10
Q.6	Two parallel shafts, about 600 mm apart are to be connected by spur gears. One shaft is to run at 360 rpm and the other at 120 rpm. Design the gears (PCD, number of teeth, exact distance between the two shafts), if the circular pitch is to be 25 mm.	10
Q.7	The turbine rotor of a ship has a mass of 3500 kg. It has a radius of gyration of 0.45 m and a speed of 3000 rpm clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship when the ship is steering to the left on a curve of 100 m radius at a speed of 36 km/h.	10
Q.8	In an epicyclic gear train, an arm carries two gears 'A' and 'B' having 36 and 45 teeth respectively. If the arm rotates at 150 rpm in the anticlockwise direction about the centre of the gear 'A' which is fixed, determine the speed of gear 'B' with the help of tabular method.	10
Q.9	A cam, with a minimum radius of 25 mm, rotating clockwise at a uniform speed is to be designed to give a roller follower the following motion, the valve is attached at the end of a valve rod. 1. To raise the valve through 50 mm during 1200 rotation of the cam; 2. To keep the valve fully raised through next 300; 3. To lower the valve during next 600; and 4. To keep the valve closed during rest of the revolution i.e. 1500; The diameter of the roller is 20 mm and the diameter of the cam shaft is 25 mm. Draw the profile of the cam when the line of stroke of the valve rod passes through the axis of the cam shaft. The displacement of the valve while being raised and lowered, is to take place with simple harmonic motion.	20

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