Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– V EXAMINATION – SUMMER 2020

Subject Code: 2151902 Date:27/10/2020

Subject Name: THEORY OF MACHINES

Time: 02:30 PM TO 05:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Define: Dynamometer. Classify Dynamometer	**03**
	(b)	Compare single block brake and double block brake.	**04**
	(c)	list experimental methods of mass moment of inertia. Explain any one .	**07**
Q.2	**(a)**	Write briefly gyroscopic effect in an aero plane.	**03**
	(b)	Explain concept of gyroscopic couple.	**04**
	(c)	The mass of the turbine rotor of a ship is 20 tonnes and has a radius of gyration of 0.60 m. Its speed is 2000 r.p.m. The ship pitches 6^0 above and below the horizontal position. A complete oscillation takes 30 seconds and the motion is simple harmonic. Solve the following: (1) Maximum gyroscopic couple (2) Maximum angular acceleration of the ship during pitching (3) The direction in which the bow will tend to turn when rising, if the rotation of the rotor is clockwise when looking from left.	**07**
		OR	
	(c)	Develop stability of four wheel vehicle moving in curved path with neat sketch.	**07**
Q.3	**(a)**	Define: (1) fluctuation of energy (2) Maximum fluctuation of energy (3) co efficient of fluctuation of energy	**03**
	(b)	Enlist dead weight governor. Explain any one.	**04**
	(c)	The turning moment diagram for a multi cylinder engine has been drawn to a scale 1 mm = 500 N-m vertically and 1 mm = 3^0 horizontally. The intercepted areas between the output torque curve and the mean resistance line, taken in order from one end, are as follows: +52, -124, +92, -140, +85, -72, and +107 mm^2, when the engine is running at a speed of 600 r.p.m and radius of gyration is 0.6 m.. If the total fluctuation of speed is not to exceed ± 1.5 % of the mean. Solve the mass of the flywheel.	**07**
		OR	
Q.3	**(a)**	Define: (1) flywheel (2) Maximum fluctuation of speed (3) co efficient of fluctuation of speed	**03**
	(b)	Enlist spring controlled governor. Explain any one.	**04**
	(c)	Design of flywheel for punching press with help of neat sketch.	**07**

Q.4	**(a)**	Define: Clutch. Classify clutch.	**03**
	(b)	Explain Prony brake dynamometer.	**04**
	(c)	An automobile single plate clutch, effective on both side consists of a pair of contacting surfaces. The inner and outer radii of friction plate are 120 mm and 240 mm respectively. The co efficient of friction is 0.25 and total axial force is 15 kN. Determine the power transmitting capacity of the clutch at 500 r.p.m. by using (1) Uniform wear theory and (2) Uniform pressure theory.	**07**

OR

Q.4	**(a)**	Define: Brake. Classify brake.	**03**
	(b)	Explain belt transmission dynamometer.	**04**
	(c)	Evaluate braking analysis of four wheeler with the help of neat sketch.	**07**
Q.5	**(a)**	Describe free body diagram.	**03**
	(b)	Explain D'Alembert's Principle.	**04**
	(c)	Analyze of dynamics force analysis of slider crank mechanism.	**07**

OR

Q.5	**(a)**	Describe shaking force and shaking moment.	**03**
	(b)	Explain Centroid and Center of mass.	**04**
	(c)	Analyze of dynamics force analysis of four bar mechanism.	**07**

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