Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2021

Subject Code:2151902 Date:03/01/2022

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define: Dynamometer. Classify Dynamometer.	**03**
	(b)	Compare single block brake and double block brake.	**04**
	(c)	Explain experimental method of compound pendulum for measuring mass moment of inertia.	**07**
Q.2	**(a)**	Write briefly gyroscopic effect in an aero plane.	**03**
	(b)	Conclude the gyroscopic effect on ship during pitching.	**04**
	(c)	The turbine rotor of a ship has a mass of 8 tonnes and a radius of gyration 0.6 m. It rotates at 1800 r.p.m. clockwise, when looking from the stern. Calculate the gyroscopic couple and its effect., if the ship travels at 100 km/hr and steer to the left in a curve of 75 m radius.	**07**
		OR	
	(c)	Develop stability of four-wheel vehicle moving in curved path with neat sketch.	**07**
Q.3	**(a)**	Define: (1) Turning moment diagram (2) Maximum fluctuation of energy (3) Co efficient of fluctuation of energy	**03**
	(b)	Explain Rope brake dynamometer with help of neat sketch.	**04**
	(c)	The turning moment diagram for a multi-cylinder engine has been drawn to a scale of 1 mm to 500 N-m torque and 1 mm to 6° of crank displacement. The intercepted areas between output torque curve and mean resistance line taken in order from one end, in sq. mm are – 30, + 410, – 280, + 320, – 330, + 250, – 360, + 280, – 260 sq. mm, when the engine is running at 800 r.p.m. The engine has a stroke of 300 mm and the fluctuation of speed is not to exceed ± 2% of the mean speed. Solve a suitable diameter and cross-section of the flywheel rim for a limiting value of the safe centrifugal stress of 7 MPa. The material density may be assumed as 7200 kg/m^3. The width of the rim is to be 5 times the thickness.	**07**
		OR	
Q.3	**(a)**	Define: (1) Flywheel (2) Maximum fluctuation of speed (3) Co efficient of fluctuation of speed	**03**
	(b)	Explain Belt Transmission dynamometer with help of neat sketch.	**04**

	(c)	Design of flywheel for punching press with help of neat sketch.	**07**
Q.4	**(a)**	Distinguish between clutch and brake.	**03**
	(b)	Explain the following terms relating to governors: 1. Stability, 2. Sensitiveness, 3. Isochronism, and 4. Hunting	**04**
	(c)	Evaluate centrifugal clutch with neat sketch.	**07**
		OR	
Q.4	**(a)**	Compare single plate clutch and multiplate clutch.	**03**
	(b)	Enlist spring-controlled governor. Explain any one.	**04**
	(c)	Evaluate internal expanding shoe brake with neat sketch.	**07**
Q.5	**(a)**	Define Applied and constraint forces.	**03**
	(b)	Explain Planner rotation about fixed Centre.	**04**
	(c)	Explain Euler's equation of motion.	**07**
		OR	
Q.5	**(a)**	State the Newton's Laws of Motion.	**03**
	(b)	Explain D'Alembert's Principle.	**04**
	(c)	Explain dynamic analysis of four bar mechanism.	**07**

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