Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2180206 **Date: 02/05/2017**

Subject Name: Automobile system Design

Time: 10:30 AM to 01:30 PM **Total Marks: 70**

Instructions:

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

Q.1	**(a)**	List the various types of steering gear box and explain any one with neat sketch.	**07**
	(b)	Explain in detail the function and construction with sketches of a leaf spring and how it is mounted on rear and front in vehicle.	**07**
Q.2	**(a)**	Write a note on (i) Difference between single and multi plate clutch (ii) Properties of clutch fluid	**07**
	(b)	A single plate clutch, effective on both sides, is required to transmit 25 kW at 3000 r.p.m. Determine the outer and inner diameters of frictional surface if the coefficient of friction is 0.255, ratio of diameters is 1.25 and the maximum pressure is not to exceed 0.1 N/mm2 . Also determine the axial thrust to be provided by springs. Assume the theory of uniform wear.	**07**
		OR	
	(b)	A centrifugal clutch is to be designed to transmit 15 kw at 900 r.p.m. The shoes are four in number. The speed at which the engagement begins is ¾ th of the running speed. The inside radius of the pulley rim is 150 mm. The shoes are lined with Ferrodo for which the coefficient of friction may be taken as 0.25. Determine: 1.mass of the shoes, and 2. Size of the shoes.	**07**
Q.3	**(a)**	Explain with neat sketches various types of rubber spring.	**07**
	(b)	Design a helical compression spring for a maximum load of 1000 N for a deflection of 25 mm using the value of spring index as 5. The maximum permissible shear stress for spring wire is 420 MPa and modulus of rigidity is 84 kN/mm2. Take Wahl's factor, K = (4c-1)/ (4c-4) + 0.615/c where C = Spring index.	**07**
		OR	
Q.3	**(a)**	Explain the Ackermann principle as applied to steering.	**07**
	(b)	A loaded narrow-gauge car of mass 1800 kg and moving at a velocity 72 m/min., is brought to rest by a bumper consisting of two helical steel springs of square section. The mean diameter of the coil is six times the side of the square section. In bringing the car to rest, the springs are to be compressed 200 mm. Assuming the allowable shear stress as 365 MPa and spring index of 6, find: (1) Maximum load on each spring, (2) Side of the square section of the wire, (3) Mean diameter of coils, and (4) Number of active coils. Take modulus of rigidity as 80 kN/mm2	**07**
Q.4	**(a)**	Describe with schematic diagram hydraulic braking system.	**07**
	(b)	A motor car has a wheel base of 2.64 m, the height of its CG above the ground is 0.61 m and it is 1.12 m in front of the rear axles. If the car is travelling at 40 km/h on a level track, determine the minimum stopping distance in which the car may be stopped. Take μ =0.6 When a) The rear wheels are braked b) The front wheels are braked	**07**

c) All four wheels are braked

OR

Q.4	**(a)**	Compare Disc type brake with Drum type of brake.	**07**
	(b)	A four-wheel passenger vehicle has a wheel base of 225 cm. Its centre of gravity is 55 cm above the ground and is 100 cm in front of the rear axle. The coefficient of friction between tyres and road surface is 0.6. calculate the minimum stopping distance, if the brakes are applied on rear wheels only at a vehicle speed of 45 km/h.	**07**
Q.5	**(a)**	Explain Johnson's method of optimum design with suitable example.	**07**
	(b)	Explain: (1) Full floating axle (2) Half floating axle	**07**

OR

Q.5	**(a)**	What is the function of universal joints? Where are the universal joints used in automobile? List down the different types of universal joints and draw schematic diagram only.	**07**
	(b)	Explain different types of axles used in automobile. Give Function of Differential used in automobile.	**07**

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