Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI(OLD) – EXAMINATION – SUMMER 2019

Subject Code:160201 **Date:27/05/2019**

Subject Name: Automobile Component Design

Time:10:30 AM TO 01:00 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)**	Explain the working of valve gear mechanism for a given I.C. engine with neat sketch.	**07**
	(b)	A helical cast steel gear with 30° helix angle has to transmit 35 kW at 1500 r.p.m. If the gear has 24 teeth, determine the necessary module, pitch diameter and face width for 20°full depth teeth. The static stress for cast steel may be taken as 56 MPa. The width of face may be taken as 3 times the normal pitch. What would be the end thrust on the gear? The tooth factor for 20°full depth involute gear may be taken as $0.154 - \frac{0.0912}{T_E}$, where TE represents the equivalent number of teeth.	**07**
Q.2	**(a)**	Explain the designing procedure of multi speed automobile gear box	**07**
	(b)	A bronze spur pinion rotating at 600 r.p.m. drives a cast iron spur gear at a transmission ratio of 4 : 1. The allowable static stresses for the bronze pinion and cast iron gear are84 MPa and 105 MPa respectively. The pinion has 16 standard 20° full depth involute teeth of module 8 mm. The face width of both the gears is 90 mm. Find the power that can be transmitted from the standpoint of strength.	**07**
		OR	
	(b)	A shaft rotating at constant speed is subjected to variable load. The bearings supporting the shaft are subjected to stationary equivalent radial load of 3 kN for 10 per cent of time, 2 kN for 20 per cent of time, 1 kN for 30 per cent of time and no load for remaining time of cycle. If the total life expected for the bearing is 20 × 106 revolutions at 95 per cent reliability, calculate dynamic load rating of the ball bearing.	**07**
Q.3	**(a)**	Explain the following terms in relation with rolling contact bearing 1)Equivalent load , 2)Bearing life.	**07**
	(b)	A four stroke diesel engine has the following specifications : Brake power = 5 kW ; Speed = 1200 r.p.m. ; Indicated mean effective pressure = 0.35 N / mm 2 ; Mechanical efficiency = 80 %. Determine: 1. bore and length of the cylinder ; 2. thickness of the cylinder head ; and 3. size of studs for the cylinder head.	**07**
		OR	
Q.3	**(a)**	Determine the beam strength and face width of helical gears, also explain the following 1) Helix angle 2) Axial pitch 3) Normal Pitch	**07**
	(b)	Design a cast iron piston for a single acting four stroke engine for the following data: Cylinder bore = 100 mm ; Stroke = 125 mm ; Maximum gas pressure = 5 N/mm2 ; Indicated mean effective pressure = 0.75 N/mm2 ; Mechanical efficiency = 80% ; Fuel consumption = 0.15 kg per brake power per hour ; Higher calorific value of fuel = 42 × 103 kJ/kg ; Speed = 2000 r.p.m.	**07**

Any other data required for the design may be assumed. Design a only following part

1) Piston head or crown
2) Piston rings
3) Piston skirt
4) Piston pin

Q.4	**(a)**	Explain strength rating and wear rating of worm gears	**07**
	(b)	Design of the crankshaft when the crank is at the dead centre for the following data :Bore = 400 mm ; Stroke = 600 mm ; Engine speed = 200 r.p.m. ; Mean effective pressure = 0.5 N/mm2; Maximum combustion pressure = 2.5 N/mm2; Weight of flywheel used as a pulley = 50 kN; Total belt pull = 6.5 kN. When the crank has turned through 35° from the top dead centre, the pressure on the piston is 1N/mm2 and the torque on the crank is maximum. The ratio of the connecting rod length to the crank radius is 5. Assume any other data required for the design.	**07**

OR

Q.4	**(a)**	Explain Design Criteria of intake manifold and exhaust manifold	**07**
	(b)	A side or overhung crankshaft for a 250 mm × 300 mm gas engine. The weight of the flywheel is 30 kN and the explosion pressure is 2.1 N/mm2. The gas pressure at the maximum torque is 0.9 N/mm2, when the crank angle is 35° from I. D. C. The connecting rod is 4.5 times the crank radius. Design of crankshaft when the crank is at the dead centre	**07**

Q.5	**(a)**	Discuss causes of failure in rolling contact bearing.	**07**
	(b)	Explain types of worm gears & Efficiency of worm gears.	**07**

OR

Q.5	**(a)**	What do you mean of creep? Explain Hot Working Process	**07**
	(b)	Differentiate between dry and wet liner. Describe the Ideal properties required for engine Piston material	**07**

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