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PAPER CODE	U325-2113 (ESE)

(AY:2024-25) May 2025 (ENDSEM) EXAM

TY (SEMESTER - II)

COURSE NAME: Transmission System Design **Branch: Mechanical** **COURSE CODE: MEUA32203R1**

(T.YPATTERN 2020R1)

Time: [1Hr 30 Min] **[Max. Marks: 40]**

(*) Instructions to candidates:

1) **Figures to the right indicate full marks. Use of scientific calculator is allowed**
2) **Use suitable data wherever required**
3) **All questions are compulsory. Solve any two sub question each from Questions 1 , 2 ,3 and 4**

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) Illustrate Gerber , Soderberg and Goodman criterion with neat sketch	[5]	1	3
	b) Illustrate the remedies used for reduction of stress concentration with neat sketch.	[5]	1	3
	c) A cantilever beam of circular cross section made of high strength alloy steel with ultimate tensile strength of 1500 N/mm² is fixed at one end and subjected to a completely reversed force of 1500 N at the free end. The force is applied normal to the axis of beam .The spam of this beam is 500 mm.Take Kt= 1.33, q= 0.85, Ka= 0.79, Kb= 0.85, and Kc=0.868.The desired life of the beam is 50000 cycles .Take factor of safety as 1.5. Evaluate the diameter of the beam.	[5]	1	3
Q2	a) Illustrate the different types of Gear tooth failure.	[5]	2	3
	b) A pair of spur gears with 20° full depth involute teeth consist of 21 teeth pinion meshing with 60 teeth internal gear. The pinion shaft is directly coupled to 7.35 kW electric motor running at 1440 rpm. The pinion and gear are made of alloy steel (Sut= 1500 N/mm²) **Evaluate the factor of safety against bending failure** only using following data: Service factor is 1.5, ,Lewis form factor of pinion is 0.3473, the module is 3 mm, the face width of gears is 35 mm, dynamic load is 8534.65 N (assume load distribution factor is 1)	[5]	2	3

	c) An ultimate tensile strength of spur pinion and spur gear are 600 MPa and 300 MPa resp. A spur pinion having 22 number of teeth is to be mesh with a gear having 60 teeth. The pinion is connected to 10 Kw,1440 rpm three phase induction motor. The gear is weaker in bending. **Evaluate the module** of the using following data: factor of safety is 1.75, velocity factor is 6 /(6+V) Service factor is 1.56, face width is 10 times module, Lewis form factor of pinion is 0.3535, Lewis form factor of gear is 0.4361. (Assume load distribution factor is 1) Use standard module series :3,4,5,6,8,10....	[5]	2	3
Q3	a) Illustrate the concept of formative number of teeth on equivalent spur gear with sketch.	[5]	3	3
	b) A right hand 18 teeth pinion meshes with 40 teeth helical gear mounted on parallel shaft. The pinion is to be driven by 22 Kw 1440 rpm motor. The tooth system is 20° full depth involute, while helix angle 23° and normal module is 6 mm. find the tangential force, axial thrust, radial force and resultant force.	[5]	3	3
	c) A pair of parallel helical gears consist of a 20 teeth pinion meshing with a 40 teeth gear. The helix angle is 25° and normal pressure angle is 20° .If the normal module is 3 mm calculate transverse module, transverse pressure angle, pitch circle diameter of pinion , pitch circle diameter of gear ,axial pitch.	[5]	3	3
Q4	a) A cylindrical roller bearing is subjected to a radial load of 5000N.The desired life of the bearing L_{10h} is 15000 hours. The equivalent dynamic load (Pe) is 7500 N. If the shaft rotates at 1440 rpm, calculate the required basic dynamic load rating (C) of the bearing?	[5]	4	3
	b) Illustrate the classification of sliding contact bearings with sketch.	[5]	4	3
	c) A single row deep groove ball bearing is subjected to radial force 5 kN and axial force of 3kN. The shaft speed is 1440 rpm. The radial load factor, X is 0.56 and axial load factor , Y is 1.4. The desired life of the bearing L_{10h} is 1000 hours of operation. Find the required dynamic load (C) carrying capacity. (Assume race rotation factor is 1).	[5]	4	3

Note: BT level-1-Remember ,2-Understand , 3-Apply , 4-Analyze, 5 –Evaluate , 6- Create