DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD – 402 103

Regular End Semester Examination – Summer 2022

Branch: M.Tech. (Mechanical) **Semester: II**

Subject with Subject Code:- Mechanical Design Analysis MMECH22 **Marks: 60**

Date: - **Time:3 Hrs.**

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Instructions to the Students

1. Each question carries 12 marks.
2. Attempt any five questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

Q. 1 a	Explain different type of failure analysis	6Marks
Q.1 b	Explain different types of oil films and there effects.	6Marks
Q. 2 a	What are the different types of energy methods? Explain in detail.	6Marks
Q. 2 b	Explain Torsional impact on shaft and longitudinal impact on helical spring.	6Marks
Q. 3 a	Describe elementary analysis of thermal stresses.	6Marks
Q. 3 b	Discuss the effect of temperature on creep and stress relaxation.	6Marks
Q. 4 a	Give typical application of polymer matrix compositions. **OR** Explain reliability based on strength.	6Marks
Q. 4 b	What is FRP? Give its advantages.	6Marks
Q. 5 a	What are the objectives of optimum design?	6Marks
Q. 5 b	Write engineering applications of optimum design?. **OR** Discuss various techniques of optimsation.	6Marks
Q. 6 a	A pair of spur gears with 20° full depth involutes teeth consists of a 18 teeth pinion meshing with 50 teeth gear. The module is 3mm while the face width is 40mm. Both the gears are made of steel (Sut=640 N/mm²). The gears are machined to meet the specifications of grade 8 and heat treated to a surface hardness of 400 BHN. The pinion rotates at 1440 rpm. The service factor is 1.5 and the factor of safety is 2. Determine the rated power that the gears can transmit.	6Marks

	For grade 8 e=16+1.25 [m+0.25√d] microns. Y=0.484 – 2.87/Z. **OR** Explain the selection process of bearing from manufactures catalogue.	
Q. 6 b	A pair of spur gears with 20° full depth involutes teeth consists of 21 teeth pinion meshing with 60teeth gear. The pinion shaft is directly coupled to 7.5 kW electric motor running at 1440 rpm. The gear shaft is transmitting power to a machine. To service factor is 1.5. Both pinion and gear are made of plain carbon steel C40 (sut=600 N/mm^2). The module and the face width of gears are 3mm and 35mm respectively. The gears are machined to the specifications of grade 8 and heat treated to a surface hardness of 300 BHN. Assuming the dynamic load is accounted by spott's equation; calculate The factor of safety against bending failure. The factor of safety against pitting failure. Dynamic load by spott's eqn use : y=0.484 2.87/z for grade 8 e= 16+1.25[m+0.25√d] microns	6Marks