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Faculty of Engineering
Department of Mechanical Engineering

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| PROBLEM 1 | | | PROBLEM 2 | | | |
|-----------|---|---|---|--|---|---|
| Part | Question | Answer | Part | Question | Answer | |
| 1 | Q1. A shaft of diameter 50 mm is fixed at one end and free at the other. It is subjected to a torque of 1000 Nm. Calculate the maximum shear stress in the shaft. | $\tau_{max} = \frac{T}{J} \cdot r$ $J = \frac{\pi d^4}{32} = \frac{\pi (50)^4}{32}$ $\tau_{max} = \frac{1000}{\frac{\pi (50)^4}{32}} \cdot 25$ | Q2. A shaft of diameter 50 mm is fixed at one end and free at the other. It is subjected to a torque of 1000 Nm. Calculate the angle of twist in the shaft. | Q3. A shaft of diameter 50 mm is fixed at one end and free at the other. It is subjected to a torque of 1000 Nm. Calculate the power transmitted by the shaft. | Q4. A shaft of diameter 50 mm is fixed at one end and free at the other. It is subjected to a torque of 1000 Nm. Calculate the maximum shear strain in the shaft. | Q5. A shaft of diameter 50 mm is fixed at one end and free at the other. It is subjected to a torque of 1000 Nm. Calculate the maximum shear stress in the shaft. |
| | Q1. A shaft of diameter 50 mm is fixed at one end and free at the other. It is subjected to a torque of 1000 Nm. Calculate the angle of twist in the shaft. | $\theta = \frac{T \cdot L}{J \cdot G}$ $J = \frac{\pi d^4}{32} = \frac{\pi (50)^4}{32}$ $\theta = \frac{1000 \cdot L}{\frac{\pi (50)^4}{32} \cdot G}$ | | | | |
| | Q2. A shaft of diameter 50 mm is fixed at one end and free at the other. It is subjected to a torque of 1000 Nm. Calculate the power transmitted by the shaft. | $P = T \cdot \omega$ $\omega = \frac{2\pi N}{60}$ $P = 1000 \cdot \frac{2\pi N}{60}$ | | | | |
| | Q3. A shaft of diameter 50 mm is fixed at one end and free at the other. It is subjected to a torque of 1000 Nm. Calculate the maximum shear strain in the shaft. | $\gamma_{max} = \frac{r}{\rho}$ $\rho = \frac{J}{T}$ $\gamma_{max} = \frac{r \cdot T}{J}$ | | | | |
| 2 | Q1. A shaft of diameter 50 mm is fixed at one end and free at the other. It is subjected to a torque of 1000 Nm. Calculate the maximum shear stress in the shaft. | $\tau_{max} = \frac{T}{J} \cdot r$ $J = \frac{\pi d^4}{32} = \frac{\pi (50)^4}{32}$ $\tau_{max} = \frac{1000}{\frac{\pi (50)^4}{32}} \cdot 25$ | Q2. A shaft of diameter 50 mm is fixed at one end and free at the other. It is subjected to a torque of 1000 Nm. Calculate the angle of twist in the shaft. | Q3. A shaft of diameter 50 mm is fixed at one end and free at the other. It is subjected to a torque of 1000 Nm. Calculate the power transmitted by the shaft. | Q4. A shaft of diameter 50 mm is fixed at one end and free at the other. It is subjected to a torque of 1000 Nm. Calculate the maximum shear strain in the shaft. | |
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