

Medium

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An induction motor develops maximum torque at slip = 0.2. 1. If rotor resistance is doubled, slip at maximum torque increases. 2. Maximum torque value remains unchanged with

A**1, 2 and 3 only****Correct****B****1 and 4 only****C****2 and 3 only****D****All of the above**

Correct Answer: A

Full Detailed Explanation

Correct Answer: A - 1, 2 and 3 only Quick Concept Explanation The torque-slip curve changes shape when rotor resistance is changed. The given initial $s_{max}=0.2$ is not needed to prove the qualitative relationships. Doubling R_2 doubles the approximate slip at maximum torque until model limits; T_{max} remains unchanged. Key relation: Approximate condition: $s_{max} \propto R_2/X_{eq}$. At $s=1$, starting torque rises as rotor resistance is increased toward the optimum $R_2 = X_{eq}$. Exam focus: Rotor resistance shifts the torque-slip curve horizontally, not vertically at T_{max} . Common trap: Saying maximum torque occurs at synchronous speed; torque is zero at $s=0$. Statement-wise Verification Statement 1 - Correct. If rotor resistance is doubled, slip at maximum torque increases. s_{max} is proportional to rotor resistance, so increasing R_2 shifts the peak torque to higher slip. Statement 2 - Correct. Maximum torque value remains unchanged with rotor resistance variation. Under constant supply and the standard equivalent-circuit approximation: the magnitude of maximum torque is essentially independent of rotor resistance. Statement 3 - Correct. Starting torque increases with rotor resistance. In the intended slip-ring-motor context: adding rotor resistance moves the operating point toward the condition for maximum starting torque and is the classic starting-torque improvement method (up to the