

[illegible]

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5. a) What losses voltage unbalance and voltage variation can create in an Induction motor? Explain their effect on a motor performance. (10)
- b) Explain, why the voltage/frequency ratio is kept constant during variable frequency operation of a three phase induction motor? Discuss its operation when supplied from a variable frequency power supply. (10)
6. a) What are the methods for speed control of an induction motors? Explain their suitability to various applications. (10)
- b) How the energy conservation can be achieved while operating a constant torque load in variable speed mode? Justify your answer with a real time example. (10)
7. a) Explain the present worth method with constant and increasing power costs and net present worth methods. (10)
- b) An energy efficient motor of 5 hp rating, 95% efficiency is used as replacement of a same rating standard motor in an industry. The difference cost of energy efficient motor is Rs.6000/- while the efficiency difference is 10%. Calculate the quantity and cost of energy saving along with payback period while considering the energy cost as Rs. 7 per unit. If the industry has 150 such motors, how much demand saving it would have? (10)
8. Write short notes on **any two** of the following : (10×2)
- a) Varying duty applications of Induction motors
- b) Power factor improvement using auto switched capacitors
- c) Application of variable frequency drives to fans and pumps