



**Module-4**

- 7 a. What are the different types of mechanical braking of electric trains? (08 Marks)  
b. What are the advantages and disadvantages of regenerative braking? (08 Marks)

**OR**

- 8 a. Explain Bow Collector and pantograph collectors used as current collectors in over head systems with suitable sketches. (08 Marks)  
b. A train weighing 500 tonnes is going down a gradient of 1 in 50. It is desired to keep train speed at 40Kmph by regenerative braking. Calculate the power fed into the line. Tractive resistance is 40N/tone. Rotational inertia : 10% and efficiency of conversion : 75%. (08 Marks)

**Module-5**

- 9 a. Compare electric vehicles with conventional IC engine vehicles. (06 Marks)  
b. Discuss the concepts and configuration of modern electric drives in detail with suitable sketches. (10 Marks)

**OR**

- 10 a. Explain the concept and working principle of hybrid electric drive trains. With its architecture with suitable sketches. (08 Marks)  
b. Write a note on the performance of electric vehicles. (08 Marks)

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