



# CBCS SCHEME

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Third Semester B.E. Degree Examination, June/July 2019

## Mining Electrical Engineering

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing one full question from each module.*

### Module-1

- 1 a. Enumerate Indian Electricity rules applicable to Mining Industry. (07 Marks)
- b. Explain the roles and responsibilities of electrical inspector in mining. (07 Marks)
- c. Explain the factors require for selection of Electrical drives. (06 Marks)

OR

- 2 a. What is an electric drive? Explain the block diagram of an electric drive. (07 Marks)
- b. Explain the qualification of officers appointed to assist the inspector for the electrical drives in mining. (07 Marks)
- c. List the advantages of electrical drives. (06 Marks)

### Module-2

- 3 a. Explain armature resistance control, voltage control and field control of a DC shunt motor. (10 Marks)
- b. Explain electrical braking and its types with its relevant diagram. (10 Marks)

OR

- 4 a. Develop the voltage and torque equation of a DC motor. (10 Marks)
- b. A 250 V, d.c. shunt motor has shunt field resistance of  $250\Omega$  and an armature resistance of  $0.25\Omega$ . For a given load torque and no additional resistance included in the shunt field circuit, the motor runs at 1500 rpm drawing an armature current of 20A. If a resistance of  $250\Omega$  is inserted in series with the field, the load torque remaining the same, find out the new speed and armature current. Assume the magnetization curve to be linear. (10 Marks)

### Module-3

- 5 a. Explain the working principle of 3-phase induction motors. (08 Marks)
- b. Explain the working principle of a synchronous motors. (08 Marks)
- c. Summarize the plugging of an induction motor. (04 Marks)

OR

- 6 a. Explain the any two methods employed for speed control of induction motor. (07 Marks)
- b. Explain the working principle of an alternator. (07 Marks)
- c. A 1492 KW, unity power factor,  $3\phi$ , star connected, 2300V, 50Hz, synchronous motor has a synchronous reactance of  $1.95 \Omega/\text{phase}$ . Compute the maximum torque in N-m which this motor can deliver if it is supplied from a constant frequency source and if the field excitation is constant at the value which would result in unity power factor at rated load. Assume that the motor is of cylindrical rotor type. Neglect all losses. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg.  $42+8=50$ , will be treated as malpractice.

**Module-4**

- 7 a. What are fuse? Explain the various types of fuses. (08 Marks)  
b. Discuss the types of enclosure are used for different motors depending upon the environmental condition. (08 Marks)  
c. Write short notes on underground cables. (04 Marks)

**OR**

- 8 a. What are circuit breakers? Explain with neat sketch, principle of operation of Air break circuit breaker. (08 Marks)  
b. With a neat sketch, explain the construction and working of bulk oil circuit breaker. (08 Marks)  
c. Write a short note on the standard voltage levels for mines as per IER 1956. (04 Marks)

**Module-5**

- 9 a. Define the following:  
i) Lumen ii) Luminous intensity iii) MHCP (12 Marks)  
iv) Candela v) Solid angle vi) Radiant efficiency (08 Marks)  
b. Describe the standards for mine lighting.

**OR**

- 10 a. Describe the design steps for lighting system in mines. (08 Marks)  
b. Illustrate luminance measurements used in mines. (06 Marks)  
c. Write a note on general lighting in underground and surface mines. (06 Marks)

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