

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-IV EXAMINATION – WINTER 2025****Subject Code:3142201****Date:13-11-2025****Subject Name:Mining Machinery - I****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

- Q.1**
- | | | |
|-----|---|-----------|
| (a) | Differentiate between Lang's lay and Ordinary lay with neat sketch. | 03 |
| (b) | Discuss advantages & disadvantages of endless rope haulage. | 04 |
| (c) | What do you mean by capping of rope? Explain Interlocking wedge type capel (Reliance capel) with neat sketch. | 07 |

- Q.2**
- | | | |
|-----|--|-----------|
| (a) | Why rope clips are used in rope haulage system? Explain cam clip with neat sketch. | 03 |
| (b) | Discuss the process of Rope splicing. | 04 |
| (c) | An endless haulage operates on a roadway 650 m long dipping at 1 in 12 and draws 630 tonnes of coal a shift (1 shift = 7.5 hours effective time). An empty tub weighs 500 kgf and its carrying capacity is 1000 kgf of coal. The rope mass 3.5kgf/m, tub friction is 1/50 and rope friction is 1/20. Speed of the rope is 6.5 km/hr. Estimate the power required by the motor. The loads are pulled up the gradient. | 07 |

OR

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|-----|---|-----------|
| (c) | Explain main & tail rope haulage system with neat sketch. | 07 |
|-----|---|-----------|

- Q.3**
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|-----|--|-----------|
| (a) | Name the parameters affecting the selection of wire rope. | 03 |
| (b) | State the type of rope to be used for: (a) Coal Cutting Machine (b) Winding Rope (c) Haulage Ropes (d) Dragline Hoist Rope | 04 |
| (c) | What are the different types of safety devices used on haulage roads? Explain with neat sketches. | 07 |

OR

- Q.3**
- | | | |
|-----|---|-----------|
| (a) | What is space factor of wire rope? How mass and strength of wire ropes is determined? | 03 |
| (b) | Explain various types of aerial ropeway system. | 04 |
| (c) | What are the types of compressor used in mine? Explain any one in detail. | 07 |

- Q.4**
- | | | |
|-----|---|-----------|
| (a) | What are the limitations on the use of different types of locomotives in underground mines? | 03 |
| (b) | Write the applicable conditions and application of aerial ropeway system. | 04 |
| (c) | Write a brief note on belt conveyor system. | 07 |

OR

- Q.4**
- | | | |
|-----|---|-----------|
| (a) | Write the applications and construction of shuttle car. | 03 |
| (b) | Sketch the layout of battery charging room used for battery operated electric locomotives in underground mines. | 04 |
| (c) | A locomotive and train have a total mass of 470 tonnes. The resistance opposing motion can be assumed to be constant and amounts to 60 N/tonne. If the locomotive can exert a constant pull of 90 kN. Find how long it will take to accelerate the train from 2 km/hr to 40 km/hr on level track. | 07 |

- Q.5** (a) What are the advantages of compressed air over other power sources? **03**
(b) A wire rope, flattened stranded with fibre core, has a diameter of 35 mm. **04**
If the steel has a tensile strength of 160 kg/mm², find out the total mass of the rope and breaking strength in SI units if the length of the rope is 125 m.
(c) What are the types of locomotives used in mines? Explain any one in detail. **07**

OR

- Q.5** (a) Sketch track layout of direct rope haulage. **03**
(b) What precautions should be taken for gage selection and lying down of tracks? **04**
(c) Explain the rope tensioning arrangement of aerial ropeway. **07**
