

22380

24225

3 Hours / 70 Marks

Seat No. 

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- Instructions* – (1) All Questions are *Compulsory*.  
(2) Answer each next main Question on a new page.  
(3) Illustrate your answers with neat sketches wherever necessary.  
(4) Figures to the right indicate full marks.  
(5) Assume suitable data, if necessary.  
(6) Use of Non-programmable Electronic Pocket Calculator is permissible.  
(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

1. **Attempt any FIVE of the following :** **10**
- a) Define Bench slope angle and ultimate pit slope angle.
  - b) Define cycle time of a shovel.
  - c) Give the flowchart for unit operations involved in coal mine production process.
  - d) Define Swing and Hoist motion related to rope shovel.
  - e) Define explosive and state its main ingredients.
  - f) State the function of Shockwave energy and pressure energy while fragmenting the rock by blasting.
  - g) Define Burden and critical burden in opencast blasthole design.

P.T.O.

- 2. Attempt any THREE of the following :** **12**
- a) Describe various conditions which favor the adoption of surface mining method.
  - b) Illustrate with neat sketch that how will you workout an opening cut for the development of working bench.
  - c) Distinguish between ANFO and slurry explosive.
  - d) Justify why there is a need for optimal blast design.
- 3. Attempt any THREE of the following :** **12**
- a) State the advantages and disadvantages if the mine is operated with larger height benches.
  - b) Justify how will you disposed off the overburden rock away from the pit.
  - c) Explain the working of percussive drilling machine.
  - d) Describe the method of firing a shot by electronic delay detonator firing system.
  - e) Describe the various steps that should be taken to reduce the ground vibration by blasting.
- 4. Attempt any THREE of the following :** **12**
- a) Explain the various preventive measures of bench slope failures.
  - b) Justify the statement “Bulldozer is the heart of an opencast mine”.
  - c) Enlist the four types of bulk loading system of explosives and explain any one of them.
  - d) Describe secondary blasting technique.

**5. Attempt any TWO of the following :****12**

- a) A project of copper ore, having a specific gravity of 4.2, is to produce 4 million tons of ore per year. It has to remove 10% of waste. Calculate the following -
- Number of hydraulic shovels of  $6.0\text{m}^3$  of capacity and
  - Number of rear dumpers of 60 tons capacity which required for 1.75km haul distance to ore handling plant.

Following are the assumptions -

- Cycle time of shovel = 35 sec.
  - One round of trip of dumper = 17 min
  - Availability of shovels = 75%
  - Availability of dumpers = 65%
  - Annual working days = 270
  - 3 shift per day working with effective 6 hours of working per shift.
  - 6 days production and 1 day maintenance per week
- b) Explain the working of dragline with a neat sketch.
- c) Describe the general requirements regarding the provision of safety devices used in HEMMs.

**6. Attempt any TWO of the following :****12**

- Compare hydraulic shovel with rope shovel.
  - Summarize the various precautionary measures of using ANFO explosives in surface mine blasting so that utmost safety standard can be achieved.
  - State the various environmental impacts which may be caused due to blasting in surface mines and explain how will you tackle the problems arised due to noise pollution.
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