

Odd-Semester Examinations – 2013-14  
V SEMESTER B.E. (MINING ENGINEERING)  
Subject: MN 501 Surface Mining

Full Marks: 70

Time Allowed: 3 hours

Use separate answer scripts for each half. Figures in the parentheses indicate marks. All parts of a question must be answered at the same place.

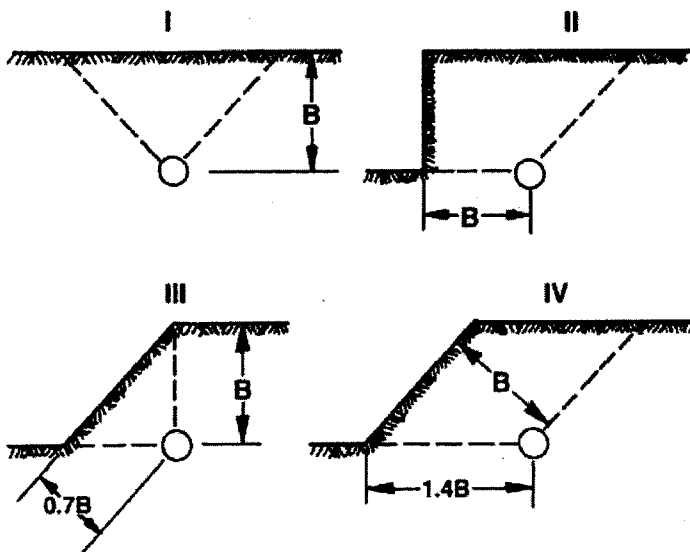
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**FIRST HALF**

Attempt question no 1 and any two questions from the rest

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1. Draw and label an extended bench range diagram for dragline operation in a flat bed coal seam with thick overburden. Using the diagram derive an expression to calculate the dragline reach requirement under the extended bench operation. Under what situations an extended bench operation is resorted to? (13)
  
2. A 5 m thick flat coal deposit is overlain by an overburden of 35 m thickness. The overburden is to be stripped using *dragline simple side-casting*. The desired bench width is 32 m and the high-wall angle will be maintained at  $70^\circ$ . The angle of repose of spoil is  $34^\circ$ . The swell coefficient is 1.28. No rehandling is contemplated. The mine has entered into a contract with a thermal power plant to supply 1.5 Mt of coal per annum. It is estimated that there will be a treatment/ processing loss of 10% and the coal has a density of  $1350 \text{ kg/m}^3$ .  
It has been planned that the dragline will operate for 350 days in a year for 20 hr per day with an average cycle time of 60 s. The availability of the machine is estimated to be 85% and the utilisation will be 85%. The bucket fill factor is estimated at 90%.  
The walking dragline will have a base of 20m and a positioning facto of 75% may be assumed.  
Using explanatory sketch determine the bucket capacity and reach requirement of the walking dragline to be deployed for carrying out the work. Assume your own data if required. (11)
  
3. a) State three distinct processes of rock breakage during blasting. With the help of the figure below describe the basic crater forms in a surface blast.



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- b) With the help of a table discuss how you will balance the chemical reactions in an explosion. A metalised ANFO slurry explosive may be roughly represented by the chemical formula  $[6\text{NH}_4\text{NO}_3; \text{CH}_2; 2\text{Al}]$ . Balance its explosion reactions. **(6+5=11)**
4. Discuss the increasing importance haul road in surface mines with special importance on safety, economy and productivity. Draw an explanatory sketch and give an expression for finding 'stopping distance' of a dump truck in relation to 'angle of descent', 'coefficient of friction at the tire-road contact area' and 'vehicle speed at time of perception'. Explain the figure below and give the desired widths of haul road under different conditions



5. How will you classify the various surface mining methods? Discuss them in brief. What are the principal equipment systems used in cyclic system of surface mining? Why mining engineers generally prefer adoption of shovel-dumper system to other systems? **(11)**

**MN 501  
SECOND HALF**

**a) Answer Question 6**

**b) Answer any two question from the rest**

6. Draw a layout of a coal mine producing 5 million tonnes per annum. Stripping ratio is 4:1. Thickness of coal seam is 10meter and overburden is 20meter. Assume your own conditions. Calculate the number of shovels required in overburden. Explain the method of mining.

(13)

7.a) What are the major operations in an opencast mine?

b) What are factors on which ultimate pit limit will depend?

(7+4)

8.a) What is the difference between overall and breakeven stripping ratios?

b) Why opencast mining is advantageous from safety and conservation point of view?

c) What are cut off grade and ore blending?

d) What are the factors to be considered before opening a surface mine ?

(4+2+2+3)

9. A 25 m thick ore deposit of high commercial value is dipping at an angle of 60 degree from the horizontal and is outcropped. Planned production is 1.5 million tonnes. Draw a layout of the mine. Also give a brief account of the method of working and give justifications for selection of the excavators.

(11)

10. Draw the quarry plans and sections for the following types of deposits

a) Tabular inclined deposit with large strike length

b) Massive deposit

c) Steeply inclined thick bedded deposit

(3+4+4)