

IV SEMESTER B.E. (MINING ENGINEERING) EXAMINATIONS - 2009-10

Subject: MN 402 Surface Mining

FIRST HALF

Attempt question no. 1 and any two questions from the rest

1. Draw and label a simple side casting 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 a simple side casting. Under what situations an extended bench operation is resorted to? (13)

2. A 3m thick flat coal deposit is overlain by an overburden of 30m thickness. The overburden is to be stripped using *dragline side-casting*. The desired bench width is 35m and the high-wall angle will be maintained at 68°. The angle of repose of spoil is 34°. The swell coefficient is 1.28. No rehandling is contemplated. The mine has entered into a contract with a thermal power plant to supply 1.6 Mt of coal per annum. It is estimated that there will be a treatment/ processing loss of 15% and the coal has a density of 1400 kg/m³.

It has been planned that the dragline will operate for 350 days in a year for 24 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 21m and a positioning facto of 75% may be assumed. The specific weight of the bucket is 1100 kg/m³ and the density of spoil is 1600 kg/m³.

Determine the bucket capacity and reach requirement of the walking dragline to be deployed for carrying out the work. Also calculate the maximum charge per cycle. (11)

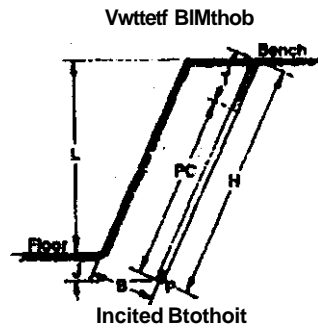
Discuss the various factors affecting equipment selection in surface mines, (11)

- a) What do you understand by the terms "deflagration" and detonation. Give examples of three chemical compounds which are explosive. TNT is an explosive having the chemical formula (C₇H₅(NO₂)₃CH₃). Determine its oxygen balance.
- b) Explain the nomenclature used in the sketch given below and give an account of the general consideration requirements for blast design in opencast mines (5+6=11)

S8S.

ft

PC



B-aurdan L - L* dpa HvtgM
 J-8uMrflI H-HoteDtptH
 T-SuMtinInQ P - Pilmf
 PC-Charge Unglft

5. How will you classify the various surface mining methods? Discuss them in brief. What are the principal equipment systems used in continuous surface mining? What are the situations where deployment of bucket wheel excavators may be preferred over conventional shovel-dumper system? (11)

SECOND HALF

Attempt question no. 6 and any two from the rest

6. Draw a layout of a coal mine producing 6 million tonnes per annum. Stripping ratio is 3:1. Thickness of coal seam is 10 meter and overburden is 25 meter. Assume your own conditions. Calculate the number of dumpers required in overburden. (13)
7. a) Discuss with a flow diagram different unit operations in an open cast mine.
b) Draw neat sketches and explain different types of deposits amenable to opencast mining.
c) What are meant by break even stripping ratio, overall stripping ratio and instantaneous stripping ratio? (4+5+2)
8. A 20m thick very rich lead zinc deposit is dipping at an inclination of 66 degree from the horizontal and is outcropping at the surface. Draw a layout of the mine producing 1.25 million tones per annum. Calculate the productivity of the excavator selected for waste excavation (11)
9. a) State what are the elements of surface mine planning.
b) Show with the help of neat sketch the design features of an opencast mine.
c) How you will draw a quarry plan with spiral ramp? (4+6+1)
- 10 a) State the factors on which location of box cut will depend
b) With the help of neat sketch explain the type of box cut suitable for deep ore deposits, and also, how subsequently working benches will be developed?
c) What is cut off grade? (4+6+1)