final

VIII Semester B.E. (Mining Engineering) Examinations – 2012-13

Subject: (MN803) Mine Planning and Design

Time allowed: ~~180 min.~~ 3 hours Full marks: 70

All parts of a question must be answered at one place.

FIRST HALF

Question 1 & 6 are mandatory ~~Attempt question no.1~~ and any ~~two~~ four questions from the rest taking at least two from each half.

1. a) A flat bedded deposit of rectangular shape having 'A' m of length and 'B' m of width is to be developed for exploitation by underground method. Derive an expression to find the optimum location of the mineral hoisting shaft. Assume other conditions. State clearly the assumptions made and the variables used.

   b) An underground coalmine is to be developed to exploit a moderately dipping seam. The transport cost in the up-rise direction is estimated to be twice that in down-dip direction. Find the optimal location of the coal raising shaft. [6+7=13]

2. a) Draw a simplified McKelvey Diagram showing graphical classification of mineral resources according to economic viability and certainty of existence. Discuss the "modifying factors" that require consideration in calculating an Ore Reserve.

   b) A mine has been planned to produce 1 Mt of coal per annum for 45 years from a 2.2 m thick coal seam dipping at 10°. Recovery is expected to be 90%. Determine the dimension of the mine along the dip and along the strike. Explain the relationship formula used. Comment on the results obtained. [6+5=11]

3. An iron ore deposit located in a remote area needs to be developed. The deposit has a mineral inventory of 250 million tonnes of high grade haematite. The deposit is a part of an iron ore range having other deposits of which five are major deposits and eight are relatively smaller deposits. There are a number of float-ore reserves too. Clearly stating the reasons and justifications discuss the steps you would follow in developing infrastructure and ancillary facilities for developing the deposit. [11]

4. At the planning stage it has been decided to carry out level division of a coal mine to be worked by underground method. Given the following data, find the inclined length of the level and the number of levels into which the mining property is to be divided.

i)	Projected daily output	2500 tonnes
ii)	Seam thickness	2.5 m
iii)	Insitu density of coal	1400 kg/m^3
iv)	Web width	60 cm
v)	Recovery	85%
vi)	Dimension of shaft field along the strike	2000 m
vii)	Number of wings to be worked simultaneously	two
viii)	Number of working cycles in coal face per day	five
ix)	Angle of inclination of the seam	15°
x)	Number of working days per year	350
xi)	Cycle co-efficient	0.9
xii)	Reserve coefficient	0.8

Assume any other data required. Explain any relationship-formula used. Draw explanatory sketches wherever required. [11]

VIII Semester B.E. (Mining Engineering) Examinations – 2012-13

Subject: MN803 Mine Planning and Design

5. a) The cage hoisting system deployed in a 324m deep mine shaft follows a symmetric three-period trapezoidal speed-time hoisting diagram with a rated acceleration (=retardation) of 0.8 $m.s^{-2}$. Speed multiplier (λ) of the hoisting system is 1.25. Find the optimum hoisting time (T) for three period hoisting system. What will be the acceleration period?

   b) If the above cage hoisting system is designed with a reserve coefficient (c) of 1.5 and operates for 12 hours a day, determine the pay load (w) of the cage to achieve an annual production (A_y) of 1.5 Mte. After every winding a rest time (t_r) of 8 second will be necessary. Assume that the mine works for 300 days per year. Assume any other data, if required. [6+5=11]

Mine Planning and Design (MIN 803)

(Second Half)

6 a) What are the elements of mine planning ?

b) What is system approach to mine planning.

c) What are the steps involved in ventilation planning?

(2+ 3+8)

7 a) An underground airway is driven at a capital cost of 13 lakh rupees. The airway with a life of 8 years is designed to pass 150 cubic metre per second with a pressure drop of 720 Pa. Efficiency of the system is 72%, rate of interest is 9.5%. Electricity cost is 4 rupees per KWh . Determine the annual capital expenses and operating costs of the ventilation system

Assume all other data .

b) The following data relate to a proposed circular shaft.

i) Equipment cost : 7 lakh rupees

ii) Excavation cost : 1200 rupees per cubic meter

iii) Fitting and lining cots : 4000 rupees per meter

iv) Coefficient of friction : 0.01

v) Air density : 1.12 kg per cubic meter

vi) Air flow : 300 meter cube per second

vii) Fan efficiency : 70%

viii) Life of the shaft : 20 years

ix) Average cost of power : 4 Rupees per KWh

x) Depth of shaft : 750m

xi) Rate of interest : 10%

Determine the optimal diameter of the shaft

Assume all other data

(5+6)

8a) The followings are the geo-mining conditions of an uranium mine.

i) Cutoff grade is 0.03% U_3O_8 (Uraninite)

ii) Dip of the vein is 40 degree

iii) Vein thickness is 10 metre

iv) Strike length is 1 km

v) Homogeneity of ore is uniform

vi) Ore strength is strong

vii) Strength of wall rock is moderate

viii) Production 700 tpd

Give the following

a) Select suitable method of work and equipments with proper justification

b) Draw a stope layout showing sequence of operation

c) Discuss about the support system

(11)

9 a) Derive an expression for cutoff grade at maximum profit.

b) An orebody is 250 m in diameter and 13m thick is outcropping at the surface . Calculate the ramp volume to access the deposit by making drive externally with respect to the deposit.

(7+4)

10 a) Discuss the steps involved in determining mine life and plant life. Explain each step by using your own assumed dataset.

b) Derive an expression for stripping ratio of a cylindrical orebody of radius 'r' meter and thickness 'h' meter.

(8+3)