Final Examination of 4TH Semester Mining Engineering May2013
Sub: Underground Mine Hazards and Climate(MN403)

Full Marks: 70 **Time: 3 Hours**

Q 1 & 6 are mandatory and answers any 4 taking atleast 2 from each half. Marks of each question are shown on the right hand side. It is obligatory to write all parts of a question in a sequence.

First Half

1.Answer as directed – **2 ½ x 6=15**

i) Why knowledge of MAC is important in respect of any underground mines in India?
ii) State the problems of dust created due to underground coal mining operation
iii) How do the size of dust particles important in mine working?
iv) What measures can be adopted to keep the level of air-borne dust within stipulated limit?
v) What is the normal frequency of dust sampling in mines? Does it changes under any circumstances?
vi) In which way the check board can help a VO/Manager?

2. i) What are the importance of dusting in mines? How do you determine the efficiency of dusting in mines? **2+5+3**
ii) Write down the scheme to be developed by mine manager on dust monitoring and control.

3. i) What measures you can suggest to suppress dust in mines? State the provision given in DGMS Cir on duration of sampling. **4+2+4**
ii) What precautions can be taken in respect of electric welding apparatus in underground mines?

4. i) What do you mean by abnormal seepage in mines? What are the conditions generally imposed by DGMS where heavy seepage of water is noticed? **2+4+4**
ii) What are the precautions taken against spontaneous heating in mines?

5.i) When underground working is suitable for coal dust explosion? What are the factors responsible to cause an explosion? **3+2+1+4**
ii) What do you mean by abnormal seepage in mines? State the reasons of inundation related accident in mines.

Second half

6 x. Answer all the questions (i to vii)

i. Explain Le Chatelier Equation with reference to limit of explosibility of a mixture of combustible gases.
ii. What do you mean by lag on ignition?
iii. What is afterdamp?
iv. Fill in the blanks: Lag on ignition property is utilized in designing _____ _____ , which produce a very short –duration flame.
v. What is geothermic gradient?
vi. What is Relative Humidity?
vii. Show that "Saturation ratio can be taken equal to relative humidity".
viii. Explain: Heat stroke. 2+1+1+1+1+1+3+3=13

2. a) What are the impurities in mine air?
b) What is Firedamp?
c) Explain the factors which control the emission of methane at the coal face.

2+1+8 =11

3. a) Explain methane layering number with its significance.
b) With an equation prove that proper oxygen balance occurs when methane content of air is 9.5% by volume.
c) What is Afterdamp?
d) The analysis of a sample of air from an old working is reported as follows:
O_2 16.52%, CO_2 3.1%, CH_4 2.45% and N_2 77.93%.

Find the percentage of air and blackdamp in the sample as well as the composition of blackdamp.

(Consider air to contain 20.95% O_2, 0.03 % CO_2 and 79.02% N_2) 3+2+1+5=11

4. Explain how Heat from Men, Heat produced my Machinery, Heat due to auto-compression and Heat due to oxidation may be the sources of heat in mine air. 3+3+3+2=11

5. Explain the followings: Vapour Pressure, , Specific Humidity, Mixing ratio, Wet –bulb temperature

2+3+3+3=11