Total number of printed pages – 4   **B. Tech**

CPMN 6307

Sixth Semester Examination – 2008

MINE ENVIRONMENT AND SAFETY ENGINEERING

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory

and any five from the rest.

The figures in the right-hand margin

indicate marks.

1. (a) Fill in the blanks :   1×10

   (i) Fire damp is a mixture of _____ .

   (ii) Maximum explosion intensity occurs when the CH_4% is _____ in a methane air mixture.

   (iii) No percentage of firedamp is explosive when the percentage of O_2 is less than _____ .

   (iv) _____ method is practiced to obtain virgin coal bed methane.

   (v) In gas masks, the catalytic oxidation of CO to relatively harmless CO_2 is carried out by a chemical named _____ .

   (vi) Self-rescuer essentially offers protection against _____ gas.

   (vii) Every entrance into a mine shall be at least _____ above the highest flood level at that point.

   (viii) An illumination of 1 lumen/m^2 is known as _____ .

   (ix) A miner working under conditions of insufficient light over long periods develops a disease known as _____ .

   (x) A flame safety lamp can not detect CH_4% below _____ .

(b) Explain the following in brief : 2×5
    (i) Graham's ratio
    (ii) Lag on ignition
    (iii) Water gas explosion
    (iv) Flat dam
    (v) Disability glare.

2. What are the sources of CO in mines ? What is its effect on human being ? Explain the principle of CO detection by MSA CO detector.
3+3+4

3. Explain the vertical borehole and cross measure borehole method of methane drainage with neat sketches. 10

4. (a) The analysis of return air from a depillaring panel resulted in CO of 80 ppm, Oxygen 20.06% and Nitrogen 79.15%. If the intake air to the panel can be assumed to be of normal atmospheric composition, what inferences could be drawn from the gas analysis data ? 5

    (b) What are the different causes of mine fires and classify mine fires accordingly ? 5

5. Explain the mechanism of firedamp explosion in a mine. What are its causes ? How does it differ from a coal dust explosion ? 10

6. (a) Outline the responsibilities of the leader of a rescue brigade during rescue operation. 6

    (b) A miner is feeling distressed after wearing a self contained breathing apparatus. Give possible reasons for the same. 4

7. (a) Discuss the reopening of a sealed-off fire area by air-locking in stages method. 6

    (b) Name the places where general lighting arrangement has to be provided in a mine at the surface and below ground. 4

8. (a) Discuss the underground measures that should be adopted for protection against inundation. 6

    (b) Calculate the maximum water pressure for a flat dam from the following data : 4

Thickness of the dam = 80 cm
Width of the roadway = 320 cm
Height of the roadway = 370 cm
Safe shearing strength of
the surrounding strata = 2.5 kg/cm^2.

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